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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte TRANS TEXAS HOLDINGS CORP.[1]

Appeal No. 2005-2643
Reexamination Control No. 90/005,842
Patent 6,052,673[2]

HEARD: January 24, 2006

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U.S. PATENT AND TRADEMARK OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES

Before MARTIN, BLANKENSHIP, and MacDONALD, Administrative Patent Judges.

MARTIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. §§ 134 and 306 from the examiner's final rejection of claims 1-28, which are all of the patent claims, under 35 U.S.C. § 103(a). We affirm.

[1] Trans Texas Holdings Corp. is the owner of the patent under reexamination. The inventors named in the patent are Tomás Leon and Lewis J. Spellman.

[2] The '673 patent issued based on Application 09/184,752, filed November 2, 1998, which purports to be a continuation of 07/780,834, filed October 23, 1991 (now Patent 5,832,461, which is identified as a continuation of 07/187,054, filed April 27, 1988 (abandoned), which is identified as a continuation of 06/770,493, filed August 27, 1985 (now Patent 4,742,457).

The Final Office Action (hereinafter "Final Action") included (at 3, ¶ 5) a rejection of claims 2, 17, and 27 under the first paragraph of 35 U.S.C. § 112, which was not repeated in the Answer and is therefore treated as withdrawn. Manual of Patent Examining Procedure § 1207.02 (8th ed. rev. 4, Oct. 2005). In any case, as pointed out by appellant in the reply brief (at 5-7), the rejection was contrary to 37 CFR § 1.552(a)[3] because the rejected claims are unamended, original patent claims.

A. Related litigation

The patent under reexamination in this proceeding (Patent 6,052,673) and the patent under reexamination in Reexamination Control No. 90/005,841 (Patent 5,832,461), which is the subject of pending Appeal No. 2005-2642, were both involved in Trans Texas Holdings Corp. v. Pacific Investment Management Co., Civ. Act. No. A99CA658SS in the United States District Court for the Western District of Texas (Austin). On August 26, 2000, the district court entered a Markman[4] order (Exhibit D to the brief) construing various terms of the claims of both patents.

In response to a question from the Board at oral argument concerning the date of dismissal of the district court action, counsel requested permission to submit a copy of the district court's docket report, which request was granted. The docket report was faxed to the board on January 25, 2006, and shows that the order dismissing the action was filed on January 8, 2001. A

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[3] 37 CFR § 1.552(a) provides: "Claims in an ex parte reexamination proceeding will be examined on the basis of patents or printed publications and, with respect to subject matter added or deleted in the reexamination proceeding, on the basis of the requirements of 35 U.S.C. 112."

[4] Markman v. Westview Instruments, Inc., 52 F.3d 967, 979, 34 USPQ2d 1321, 1329 (Fed. Cir. 1995), aff'd, 517 U.S. 370, 372, 38 USPQ2d 1461, 1463 (1996).

copy of that order, entitled "Order of Dismissal With Prejudice" (incorrectly giving the year as 2000), accompanied the reply brief as Exhibit G.

B. Related appeal

A decision is being mailed concurrently herewith in Appeal No. 2005-2642 in the '841 reexamination proceeding.

C. The invention at issue

The claims are directed to a method of managing financial accounts wherein an institution (a) offers inflation-indexed deposit accounts and (b) at least partially offsets the cost of those accounts by holding one or more assets, such as loan accounts, having a rate of return indexed to inflation. '673 Patent at col. 2, ll. 55-59. Each deposit account and loan account has a principal component and an accrual component. Id. at col. 2, l. 66 to col. 3, l. 1. In the case of a loan account, either the loan principal component or the loan accrual component is adjusted in response to inflation. See claims 5 and 6.

All of the pending claims are unamended, original patent claims. There are four independent claims (1, 9, 22, and 25), of which claim 1 reads:

> 1. A method of managing financial accounts comprising:
> providing a plurality of deposit accounts with a financial institution;
> adjusting the amount in each deposit account as a function of a rate of inflation;
> providing at least one loan account with said financial institution using funds deposited with the financial institution;

adjusting the amount in the loan account as a unction [sic[5]] of a rate of inflation using an account data processor,
paying the deposit accounts; and
receiving repayment of the loan account by said financial institution in a manner where the funds in the loan account obtain a rate of return responsive to a rate of inflation.

D. The grouping of the claims

At page 5 of the brief, appellant states that "[f]or purposes of this Appeal, all of the claims shall be considered separately and do not stand or fall together." Under 37 CFR § 1.192(c)(7) (2001), which was in effect when the brief was filed, a group of claims rejected on the same ground can be treated as standing or falling together unless the brief states that the claims of the group do not stand or fall together and explains why the claims are believed to be separately patentable. As noted below, some of the rejected claims have not been separately argued and thus will be treated as standing or falling with their parent claims.

E. The scope and meaning of the claims

"[D]uring examination proceedings, claims are given their broadest reasonable interpretation consistent with the specification." In re Hyatt, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (citing In re Graves, 69 F.3d 1147, 1152, 36 USPQ2d 1697, 1701 (Fed. Cir. 1995); In re Etter, 756 F.2d 852, 858, 225 USPQ 1, 5 (Fed. Cir. 1985) (en banc)).

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[5] No certificate of correction of correction has been filed to correct this or any other error in the original patent.

Thus, as explained in In re American Academy of Science Tech Center, 367 F.3d 1359, 1369, 70 USPQ2d 1827, 1834 (Fed. Cir. 2004), which was an appeal from a Board decision in a reexamination proceeding,

> the Board is required to use a different standard for construing claims than that used by district courts. We have held that it is error for the Board to "appl[y] the mode of claim interpretation that is used by courts in litigation, when interpreting the claims of issued patents in connection with determinations of infringement and validity." In re Zletz, 893 F.2d 319, 321 [13 USPQ2d 1320, 1321] (Fed. Cir. 1989); accord In re Morris, 127 F.3d 1048, 1054 [44 USPQ2d 1023, 1028] (Fed. Cir. 1997) ("It would be inconsistent with the role assigned to the PTO in issuing a patent to require it to interpret claims in the same manner as judges who, post-issuance, operate under the assumption the patent is valid."). Instead, as we explained above, the PTO is obligated to give claims their broadest reasonable interpretation during examination.

Appellant's reliance (Brief at 9) on the claim interpretation given in the district court's Markman order is therefore misplaced.

Appellant nevertheless argues (Reply at 4-5) that we are bound by the district court's Markman order under the doctrine of issue preclusion discussed in In re Freeman, 30 F.3d 1459, 1465-69, 31 USPQ2d 1444, 1448-51 (Fed. Cir. 1994). This argument fails because the Markman order was not "necessary to the judgment rendered in the previous action," which is one of the four conditions for application of the doctrine:

> Issue preclusion is appropriate only if: (1) the issue is identical to one decided in the first action; (2) the issue was actually litigated in the first action; (3) resolution of the issue was essential to a final judgment in the first action; and (4) plaintiff had a full and fair opportunity to litigate the issue in the first action. A.B. Dick Co. v. Burroughs Corp., 713 F.2d 700, 702, 218 USPQ 965, 967 (Fed. Cir. 1983), cert. denied, 464 U.S. 1042 (1984).

Freeman, 30 F.3d at 1465, 31 USPQ2d at 1448. Regarding claim interpretation, the Freeman court further explains:

> In the context of claim interpretation, this court has held that
>
> > judicial statements regarding the scope of patent claims are entitled to collateral estoppel effect in a subsequent infringement suit only to the extent that determination of scope was essential to a final judgment on the question of validity or infringement.
>
> A.B. Dick Co., 713 F.2d at 704, 218 USPQ at 968. This court has warned, however, that statements regarding the scope of patent claims made in a former adjudication should be narrowly construed. Id. Additionally, to apply issue preclusion to a claim interpretation issue decided in a prior infringement adjudication, "the interpretation of the claim had to be the reason for the loss [in the prior case] on the issue of infringement." Jackson Jordan, Inc. v. Plasser American Corp., 747 F.2d 1567, 1577, 224 USPQ 1, 8 (Fed. Cir. 1984).

Freeman, 30 F.3d at 1466, 31 USPQ2d at 1449. The district court action at issue here concluded with a dismissal rather than with a judgment on validity or infringement.

In giving claims their broadest reasonable construction, the PTO will "tak[e] into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification." Morris, 127 F.3d at 1054, 44 USPQ2d at 1027. However, we are not permitted to read limitations from the disclosed embodiments or examples into the claims. See American Academy, 367 F.3d at 1369, 70 USPQ2d at 1834:

> We have cautioned against reading limitations into a claim from the preferred embodiment described in the specification, even if it is the only embodiment described, absent clear disclaimer in the specification. See Liebel-Flarsheim Co. v. Medrad, Inc., 358 F.3d 898, 906 [69 USPQ2d 1801] (Fed. Cir. 2004) ("Even when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using 'words or expressions of manifest exclusion or restriction.'"); Teleflex, Inc. v. Ficosa N. Am. Corp., 299 F.3d 1313, 1325 [63 USPQ2d 1374] (Fed. Cir. 2002).

The principal point of contention regarding the scope and meaning of the claims is the relationship between the rate of prior actual inflation and the resulting inflation adjustments of the deposit and loan accounts. Appellant contends that the claims require a continuous (i.e., nonstepped) relationship between the inflation adjustments and the inflation rates such that different amounts of prior actual inflation will result in different inflation adjustments. For the following reasons, we do not agree.

Claim 1 recites the relationship between the rate of inflation and the resulting inflation adjustment in two different ways, the first being to describe it as a "function" in the steps of "adjusting the amount in each deposit account as a function of a rate of inflation" and "adjusting the amount in the loan account as a [f]unction of a rate of inflation." The second is to call for "receiving repayment of the loan account . . . in a manner where the funds in the loan account obtain a rate of return responsive to a rate of inflation." We will begin by addressing the meaning of the phrase "as a function of a rate of inflation." Neither this phrase nor the term "function" is defined in the specification. Appellant cites Webster's Ninth New Collegiate Dictionary 498 (1987) (Exhibit E to brief), which gives a number of definitions of "function," of which appellant relies on the following: "**5 a**: a mathematical correspondence that assigns exactly one element of one set to each element of the same or another set **b**: a variable (as a quality, trait, or measurement) that depends on and varies with another (height is a ~ of age)." Brief at 10. While the examiner correctly observed that the term "function" is broad enough to embrace "discrete" functions, which he characterizes as being noncontinuous (Final Action at 29;

Answer at 23), he did not cite any supporting authority. Nevertheless, it is evident from the term "step function" that a "function" need not be continuous. See Webster's Third New International Dictionary of the English Language – Unabridged 2237 (copy enclosed) (1971 ed.) (defining "step function" as "a function of a single real variable in mathematics that remains constant throughout each of a series of adjacent intervals with the constant value varying from interval to interval"). A graph of a "step function" appears as Figure 32 in Margaret L. Lial, E. John Hornsby, Jr., and David I. Schneider, College Algebra 236-37 (copy enclosed) (7th ed. 1997). The phrase "as a function of a rate of inflation" employed in the claim therefore does not imply a continuous function or preclude a step function.

Turning now to the step of "receiving repayment of the loan account . . . in a manner where the funds in the loan account obtain a rate of return responsive to a rate of inflation," appellant relies on the following definition of "responsive to the rate of inflation" in the specification: "Responsive to the rate of inflation, as used herein, means directly responsive to a market indicator of prior actual inflation and it is not meant to include the market's expectation of future inflation." '673 Patent at col. 3, ll. 11-14. This definition has several possible interpretations. It can be construed as defining (1) only the phrase "responsive to the rate of inflation"; (2) the phrase "the rate of inflation" (our emphasis), whether or not preceded by "responsive to"; or (3) the phrase "rate of inflation," whether preceded by "a" or "the." We conclude that interpretation (3) is the broadest reasonable one and will so construe the phrase "rate of inflation" in all of the claims. As for the effect of the use of "directly responsive to" instead of "responsive to" in the definition, the broadest reasonable interpretation of the chosen

phraseology is that it was meant to emphasize that the calculations of inflation adjustments must be based on the market indicator data which represents prior actual inflation (e.g., the CPI-U). See The American Heritage Dictionary of the English Language 373 (copy enclosed) (New College Edition, 1975) (hereinafter American Heritage Dictionary) (defining "directly" to mean: "1. In a direct line or manner; straight. . . . 2. Without anyone or anything intervening; immediately."). Nothing in the specification clearly evidences an intent to have the phrase "directly responsive to" construed as requiring a continuous relationship.

Appellant's argument that the foregoing definition from the '673 patent requires us to construe claim 1 as requiring that the inflation adjustments in the deposit and loan accounts be continuous functions of the rate of prior actual inflation is wrong on two counts. First, as explained above, the phrase "directly responsive to" in the definition does not imply a continuous relationship. Second, even assuming it does, the definition does not address the relationship between the inflation adjustments and the rate of inflation. Instead, it addresses the relationship between the inflation adjustments and "a market indicator of prior actual inflation," which need not represent the rate of prior actual inflation. In fact, appellant's disclosed market indicators of prior actual inflation represent inflated price levels, from which the inflation rates and the resulting inflation adjustments are calculated:

> Once the current inflation index (CPIc) is determined, the level of inflation since the last reporting period is estimated by consideration of a preselected inflation index which reflects prior actual inflation. A preferred embodiment of the present invention utilizes the consumer price index CPI-U, for all items. However, any number of indexes may be successfully utilized including, but not limited to CPI-W, Producer Price Index, the Implicit Price Deflator for the Gross National Product, or any component of these price level measures so long as the index

> reflects some measure of past inflation. The level [of] inflation which has occurred since the previous iteration period can be determined by the formula:
>
> $$\frac{CPIc - CPIo}{CPIo}$$
>
> Where CPIo i[s] the inflation index at the time of the last iteration, or the initial index if the present iteration is the first.

'673 Patent at col. 6, ll. 27-46 (emphasis added). "If . . . inflation has occurred during the prior iteration period, the cash outflow or disbursement attributable to the effects of inflation on the account balance is determined by applying the inflation rate to the deposit balance." Id. at col. 6, ll. 58-62. Because the "market indicator of prior actual inflation" need not represent the rate of prior actual inflation, any claim recitations of inflation adjustments "responsive to a rate of inflation" should be understood as requiring no more than that the inflation adjustments be (a) "responsive to" the rate of prior actual inflation and (b) "directly responsive to" (i.e., based on) the data of a market indicator of prior actual inflation, which may represent inflated price levels rather than inflation rates.

Appellant's reliance on the district court's Markman order (Brief at 9) for a narrower definition of the language of claim 1 and the other claims is improper for the reasons given above. Also, because it is improper to read disclosed examples into the claims, American Academy, 367 F.3d at 1369, 70 USPQ2d at 1834, we are unpersuaded by appellant's argument that:

> [i]n each of the examples in the '461 [sic; '673] specification, the inflation component is adjusted for any amount of inflation, and adjusted on a one-for one basis. '461 [sic] specification, col. 10 to col. 26. Accordingly, reading the

> definition and the examples, one of skill would understand that there must be a direct correspondence between the rate of inflation and the amount by which the variable interest component is adjusted.

Brief at 8.

The remaining claim construction issues are addressed below in the discussions of the rejections.

F. The references

The rejections rely on the following references:

4,774,663	Musmanno et al. ("Musmanno")	Sep. 27, 1988 (filed Nov. 21, 1983)

Santosh Mukherjee and Claire Orlans, Indexation in an Inflationary Economy – A Case Study of Finland, Vol. XL, Broadsheet No. 551, PEP – The Social Science Institute, April 1975, at 50-73 and 106-11 ("Mukherjee").[6]

Gloria J. Weiner, Choosing a home equity plan," 84 Restaurant Business 100 (Feb. 10, 1985) ("Weiner").

G. The grounds of rejection

Claims 1-24 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Mukherjee in view of Musmanno.

Claims 15 and 25-28[7] stand rejected under § 103(a) as unpatentable over Mukherjee in view of Musmanno and further in view of Weiner.

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[6] A better copy of Mukherjee than is currently of record accompanies this decision.

[7] The rejected claims are incorrectly identified as "claims 15 and 25-25" in the statement of the rejection given at page 20, ¶ 32, of the Final Action and as "claims 15 and 25-27" in the statement of the rejection given at page 18, ¶ 27 of the Answer.

H. The Mukherjee and Musmanno references

Mukherjee describes the Finnish experience from 1950-69 with inflation-indexing of bank deposit accounts (at 50-56), government- and industry-issued bonds (at 57-63), social security, pensions, and insurance (at 63-66), bank loans (at 67-69), and commercial and property contracts (at 70-73).

The Finnish banking system was divided into three groups: (a) commercial savings; (b) cooperative; and (c) Post Office. Mukherjee at 50, 1st para. "As the rapid inflation of 1950-1 was being checked by the stabilisation programme begun in October 1951, the banks took the decision, in principle, to adjust both their loans and deposits for inflation, on the basis of quarterly inspections of the cost-of-living index." Id. at 50, second para. While "[t]he initial idea had been to apply an extra charge to all loans equal to half the rise in the index, and then to use the funds to compensate all depositors for half their loss due to inflation," id. at 50, last para., that initial idea was not adopted. Instead,

> [w]hat was eventually decided was different and more complex. Not all deposits were index-linked, but only specifically designated accounts carrying certain restrictions on withdrawal. Full inflation proofing was given to these designated accounts. The money needed to make them keep pace with the cost of living was found by imposing an 'index surcharge' on all loans. The amount of the surcharge was usually fixed according to the proportion of the bank's deposits benefiting by index adjustment, so that the bank could just balance its commitments.

Id. at 50-51. The first index-linked bank deposit accounts went into effect in May 1955 and had the following characteristics:

(1) A lump sum of 30,000 markka was required to open the account;

(2) Withdrawals were not permitted during the first year;

(3) The fixed interest paid on the account balance was 1 to 1½ percentage points below that paid for normal deposits; and

(4) They did not share the tax exemption enjoyed by ordinary savings accounts.

Mukherjee at 51, 2d full para.

Furthermore, the indexing feature operated in a stepped, discontinuous manner rather than a continuous manner:

> Once the cost-of-living index (October 1951 = 100) had risen 2 points above 104, the capital was increased by as many as 2 full per cents as the index had risen between deposit and withdrawal. The figures used were the averages (to the nearest whole number) of the index values for the three months before deposit and withdrawal respectively. The system did not work the other way; no reduction would take place if the index fell.

Id. at 51, 3d full para. In January 1957, a choice of two kinds of index-linked accounts became available to the public: in addition to the above taxable accounts, thereafter called 'A' accounts, 'B' accounts were offered which were tax-free (like normal, nonindexed deposit accounts) but gave only 50 per cent index compensation. Id. at 52, 2d full para. The interest rates for the two types of accounts were as follows:

> 'A' and 'B' accounts at first carried the same basic rate of interest of 4¾ per cent. In January 1957, when 'B' accounts started, the index clause for 'A' accounts was made more sensitive. Compensation was now to be paid for full 1 per cent changes in the cost-of-living index, instead of full 2 per cents. 'B' accounts received exactly half the index-related compensation rate paid on 'A' accounts.

Id. at 54, 4th full para. The phrase "basic rate of interest" in the foregoing passage refers to a fixed rate of interest. Appellant does not contend otherwise.

'B' accounts suffered a death blow when 'A' accounts, which provided full indexing, were freed from taxation. Mukherjee at 56, 2d para.

Under the heading "Sudden death" at page 56, Mukherjee explains that in March 1968, a stabilization agreement signed by the central trade union and employer organizations abolished the system of index linkage for wages, rents, business contracts, bonds, and bank deposits and that this agreement precluded the index clause from being applied to bank deposits after November 30, 1968. Id. at 56, 4th para.

Banks paid for the inflation-related costs of the indexed deposit accounts in several ways. In the discussion of indexed government and industry bonds (at 57-63), Mukherjee notes that "[b]anks and cooperative credit societies needed the income from index bonds to help pay compensation on indexed deposit accounts." Id. at 59, 1st full para. In the discussion (at 67-69) of inflation-indexed loans offered by various organizations, including the National Pensions Institute, insurance companies, banks, and the government, Mukherjee explains:

> Banks started to make indexed charges on loans when their indexed deposit business became of appreciable size. In the savings and cooperative bank sector this was in 1956. Similar charging arrangements by the commercial banks did not come into operation until rather more than a year after that. This part of the banking sector had interrupted this business for a year, and initially were able to cover indexed payments to depositors with income from their holdings of government indexed bonds.
>
> The Post Office Bank usually tied its loans 25 per cent to the cost-of-living index. All other banks operated on the principle of calculating an index surcharge on all loans at rates just sufficient to cover indexed payments to depositors. This meant, for example, that in a year when the index rose by 10 per cent, a bank with one fifth of its deposits in fully index-linked accounts would place an index

> surcharge of 2 per cent on all its outstanding loans. This surcharge became payable immediately by borrowers as additional interest; the outstanding debt was not, however, written up.

Id. at 67-68.

Mukherjee fails to disclose the use of a data processor for servicing accounts. The examiner relies on Musmanno for this teaching. Musmanno's Figures 1A, 1B, and 2-4 depict, in flow-chart form,

> a data processing implementation for a brokerage-cash management financial system which provides for automatic investment of free credit cash balances in short term investments which include an insured savings account option; a full range of security brokerage transaction functions; which permits consumer transaction ("charge") card and check charges; and which includes safeguards against abuses., e.g., check kiting.

Musmanno, col. 1, ll. 24-33. Appellant concedes that these flow charts represent operations performed by a data processor. See Brief at 15-16 ("Musmanno . . . teaches the use of a specific type of data processing to manage a specific type of account, the so-called Cash Management Account. Musmanno teaches specific software for carrying this function out, which is shown, for example, in Figures [1A, 1B], 2, 3 and 4.").

The examiner does not contend that Musmanno discloses using a data processor to service inflation-indexed accounts.

I. The merits of the rejection of claims 1-24 for obviousness over Mukherjee in view of Musmanno

The legal conclusion that a claim is obvious within § 103(a) depends on at least four underlying factual issues: (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the pertinent art; and (4) an evaluation of any relevant secondary considerations. See Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17, 148 USPQ 459, 467 (1966). As explained in Princeton Biochemicals Inc. v. Beckman Coulter Inc., 411 F.3d 1337, 75 USPQ2d 1051, 1054 (Fed. Cir. 2005), it is also necessary to consider the question of motivation:

> As this court pointed out in Ruiz v. A.B. Chance Co., 357 F.3d 1270, 1275 [69 USPQ2d 1686, 1690] (Fed. Cir. 2004), in making the assessment of differences between the prior art and the claimed subject matter, section 103 specifically requires consideration of the claimed invention "as a whole." . . .
> . . . This "as a whole" assessment of the invention requires a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would have selected the various elements from the prior art and combined them in the claimed manner. Id. In other words, section 103 requires some suggestion or motivation, before the invention itself, to make the new combination. See In re Rouffet, 149 F.3d 1350, 1355-56 [47 USPQ2d 1453, 1456] (Fed. Cir. 1998).

Appellant has not submitted any declarations or affidavits addressing the level of ordinary skill in the art. Therefore, the level of skill in the art must be ascertained from the references themselves. See In re Oelrich, 579 F.2d 86, 91, 198 USPQ 210, 214 (CCPA 1978) ("the PTO usually must evaluate both the scope and content of the prior art and the level of ordinary skill solely on the cold words of the literature"); In re GPAC Inc., 57 F.3d 1573, 1579,

35 USPQ2d 1116, 1121 (Fed. Cir. 1995) (Board did not err in adopting the approach that the level of skill in the art was best determined by the references of record).

In the absence of any indication to the contrary by the examiner, we assume the rejected claims are entitled to the benefit under 35 U.S.C. § 120 of the August 27, 1985, filing date of Application 06/770,493, the earliest of the chain of "continuation" applications that led up to the application which issued as the patent under reexamination.

In claim 1, steps a, b, and e relate to indexed deposit accounts and the remaining steps relate to indexed loan accounts:

> 1. A method of managing financial accounts comprising:
> [a] providing a plurality of deposit accounts with a financial institution;
> [b] adjusting the amount in each deposit account as a function of a rate of inflation;
> [c] providing at least one loan account with said financial institution using funds deposited with the financial institution;
> [d] adjusting the amount in the loan account as a [f]unction of a rate of inflation using an account data processor,
> [e] paying the deposit accounts; and
> [f] receiving repayment of the loan account by said financial institution in a manner where the funds in the loan account obtain a rate of return responsive to a rate of inflation.

For the reasons given above, the term "function," which appears in steps b and d, is broad enough to encompass a step function. As also explained above, the phrase "responsive to the rate of inflation," which appears in step f, does not require that the rate of return on the loan account

be a continuous function of the rate of inflation. As will appear, even assuming the claim should be given this narrow construction, it would be satisfied by Mukherjee.

Before comparing the other language of claim 1 to Mukherjee, we will address the examiner's reliance on Musmanno as evidence that "it was notoriously well-known to employ data-processors to manage plural accounts," Final Action at 5, and the examiner's assertion that it therefore would have been obvious to "automate MUKHERERJEE [sic] et al. on a data-processor such as MUSAMANNO [sic] et al. in order to facilitate account management." Id. at 5-6 (underlining omitted). We agree that it would have been obvious in view of Mukherjee and Musmanno, prior to appellant's August 27, 1985, effective filing date, for a bank to offer inflation-indexed deposit and loan accounts and to service the accounts with a data processor in order to obtain the speed and accuracy offered by automated (as opposed to manual) processing. Appellant's argument that Musmanno's software is "totally inapplicable to the issue at hand: the management of indexed accounts," Brief at 16, is unconvincing because the examiner is not proposing to use the same software that is represented by Musmanno's flow charts to service Mukherjee's inflation-indexed accounts. "Claims may be obvious in view of a combination of references, even if the features of one reference cannot be substituted physically into the structure of the other reference." Orthopedic Equip. Co. Inc. v. United States, 702 F.2d 1005, 1013, 217 USPQ 193, 200 (Fed. Cir. 1983) (citing In re Anderson, 391 F.2d 953, 958, 157 USPQ 277, 281 (CCPA 1968)). Instead, what matters in the § 103 nonobviousness determination is whether a person of ordinary skill in the art, having all of the teachings of the references before him, is able to produce the structure defined by the claim. Orthopedic Equip., 702 F.2d at 1013,

217 USPQ2d at 200 (citing In re Twomey, 218 F.2d 593, 596, 104 USPQ 273, 275 (CCPA 1955)). On this point, appellant argues:

> The complexity of the data processing required for carrying out the claimed invention is evident in the four examples of data processing systems described in the subject patent specification (see Figures 2-5), along with the numerous and varied permutations of these four systems that they enable and that would be evident to those of skill in light thereof, which provide those of skill with the basic understanding to . . . necessary to overcome the problems that faced the Finnish system and that apparently led to the "Sudden Death" of that system.

Brief at 17. This argument fails for several reasons, the first of which is that, as noted above, Mukherjee attributes the "[s]udden death" of the Finnish system of providing inflation-adjusted accounts to the 1968 trade agreement which abolished inflation indexing. Mukherjee at 56, 4th para. Second, appellant has not explained, and it is not apparent from an examination of appellant's Figures 2-5, why appellant believes a programmer[8] having ordinary skill in the art just prior to appellant's effective filing date would have been unable to design suitable data processing software for implementing inflation-adjusted deposit and loan accounts of the type disclosed by Mukherjee.

Comparing claim 1 to the inflation-linked accounts thus implemented, the examiner correctly reads step a ("providing a plurality of deposit accounts with a financial institution") and step b ("adjusting the amount in each deposit account as a function of a rate of inflation") on inflation-indexed deposit accounts like Mukherjee's 'A' and 'B' bank deposit accounts,

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[8] Where an invention involves two technologies (here, computer programming and financial systems), the person having ordinary skill is presumed to have ordinary skill in both technologies. In re Brown, 477 F.2d 946, 950-51, 177 USPQ 691, 694 (CCPA 1973).

discussed at pages 51-56. Final Action at 4, ¶ 8. As explained above, the claim language is broad enough to read on these accounts even though the inflation adjustments are step functions of the rates of prior actual inflation. We note that these two steps alternatively read on the initially proposed accounts that were not adopted, which are described at page 50, last paragraph ("The initial idea had been to apply an extra charge to all loans equal to half the rise in the index, and then to use the funds to compensate all depositors for half their loss due to inflation."). The fact that the initially proposed accounts were never adopted does not detract from Mukherjee's status as a publication disclosing the desirability of such accounts. See In re Sivaramakrishnan, 673 F.2d 1383, 1384-85, 213 USPQ 441, 442 (CCPA 1982):

> That Gable may not have actually reduced the specific mixture of resin and cadmium salt to practice has no bearing on whether the mixture is "described in a printed publication" under §102(b). See e.g., Mannix Co. v. Healey, 341 F.2d 1009, 1010 n.1, 144 USPQ 611, 612 n.1 (CA 5 1965); Siegel v. Watson, 267 F.2d 621, 624, 121 USPQ 119, 121 (CADC 1959); Ritter v. Rohm & Haas Co., 271 F. Supp. 313, 341, 154 USPQ 518, 542 (S.D.N.Y. 1967). Cf. In re Deters, 515 F.2d 1152, 1155, 185 USPQ 644, 647 (CCPA 1975) (that a reference is a "paper patent" is irrelevant to its value as evidence of level of skill in the art); In re Blake, 53 CCPA 720, 724, 352 F.2d 309, 312, 147 USPQ 289, 291 (1965) (patent statute does not require commercial use of subject matter of a prior-art disclosure for that disclosure to qualify as a reference).

Therefore, assuming appellant is correct to construe claim 1 as requiring a continuous relationship between inflation adjustments of the deposit accounts and the inflation rate, the claim would read on the initially proposed indexed deposit accounts.

The examiner also correctly reads step e ("paying the deposit accounts") on Mukerhjee's indexed deposit accounts, citing Mukherjee's mention (at 51, 3d para.) of withdrawals from those accounts. Final Action at 5.

Turning now to the "loan" provisions, step c ("providing at least one loan account with said financial institution using funds deposited with the financial institution") clearly reads on Mukherjee's disclosure that the same savings banks which offered indexed deposits also offered indexed loans. Mukherjee at 50, last para. to 51, 1st para.; at 67, last para. to 68, 1st full para.

Regarding step d ("adjusting the amount in the loan account as a [f]unction of a rate of inflation using an account data processor"), the examiner is incorrect to rely on "page 51 Paragraph 2 et seq." and on "page 50, col. 2, Paragraph 3 [sic; page 51, paragraph 3]," Final Action at 4-5, ¶ 8, because those paragraphs discuss indexed deposit accounts rather than indexed loan accounts. However, that step can be read on the parts of Mukherjee on which the examiner correctly reads step f ("receiving repayment of the loan account by said financial institution in a manner where the funds in the loan account obtain a rate of return responsive to a rate of inflation"). Those parts are Mukherjee's discussion of indexed loans at (a) page 50, last paragraph ("The initial idea had been to apply an extra charge to all loans equal to half the rise in the index, and then to use the funds to compensate all depositors for half their loss due to inflation"); and (b) page 68, first full paragraph ("The Post Office Bank usually tied its loans 25 per cent to the cost-of-living index."). Final Action at 5. Both of these techniques satisfy steps d and step f even if the claim is construed to require that the loan amount be a continuous (i.e., nonstepped) function of the inflation rate. Appellant's contention (Reply brief at 6) that the 25

per cent relationship employed by the Post Office Bank is not a one-to-one relationship appears to be an unsupported attempt to define "directly responsive" even more narrowly to mean "responsive in the same degree." Claim 1, if narrowly construed to require that the loan amount be a continuous function of the inflation rate, also reads on the indexing technique employed by the banks other than the Post Office Bank:

> All other banks operated on the principle of calculating an index surcharge on all loans at rates just sufficient to cover indexed payments to depositors. This meant, for example, that in a year when the index rose by 10 per cent, a bank with one fifth of its deposits in fully index-linked accounts would place an index surcharge of 2 per cent on all its outstanding loans. This surcharge became payable immediately by borrowers as additional interest; the outstanding debt was not, however, written up.

Mukherjee at 68, 2d para. The fact that the size of the index surcharge on each loan account is determined in part by the percentage of deposits held in indexed accounts does not alter the fact that the index surcharge is a function (more particularly, a continuous function) of the inflation rate.

Appellant also faults Mukherjee for failing to disclose "a loan account and a deposit account, where both are directly responsive to a rate of inflation – this is the so-called 'fully hedged' program where the inflation-based cash flows in[to] and out of the accounts mirror one another to achieve an inflation hedge for the institution." Brief at 14. This argument is unconvincing because (1) the claim does not require that the "out" cash flow due to indexing of the deposit accounts be equal the "into" cash flow due to indexing of the loan accounts and (2) in any event, Mukherjee describes equalizing these cash flows when he explains (a) that

"[t]he amount of the surcharge [on all loans] was usually fixed according to the proportion of the bank's deposits benefitting by index adjustment, so that the bank could just balance its commitments," Mukherjee at 50, last para., and (b) that "The Post Office Bank usually tied its loans 25 per cent to the cost-of-living index. All other banks operated on the principle of calculating an index surcharge on all loans at rates just sufficient to cover indexed payments to depositors." Id. at 68, 1st full para.

For the foregoing reasons, we conclude that claim 1 reads on Mukherjee as modified in view of Musmanno and are affirming the rejection of that claim.

The rejection of claims 2 and 3, which are dependent on claim 1, rejected over the same prior art as claim 1, and not separately argued, is affirmed for the same reasons as the rejection of claim 1. 37 CFR § 1.192(c) (2001).

Dependent claim 4 calls for the loan account to have a principal loan component and a loan accrual component. Claim 5, dependent on claim 4, calls for "determining the amount in the loan accrual component as a function of the rate of inflation." While the bank loans described at pages 67 and 68 of Mukherjee are not described as having principal and accrual (i.e., interest) components, we hereby take official notice that it was common practice to divide a loan into a principal component and at least one accrual component representing the fixed interest component, which is enough to satisfy claim 4. See In re Ahlert, 424 F.2d 1088, 1091, 165 USPQ 418, 420-21 (CCPA 1970) (PTO tribunals, where it is found necessary, may take notice of facts beyond the record which, while not generally notorious, are capable of such instant and unquestionable demonstration as to defy dispute). In any event, appellant does not deny that it

was common practice to divide a loan into a principal component and at least one accrual (i.e., interest) component. Instead, appellant gives two reasons why Mukherjee's loans did not have an accrual component which is a function of the rate of inflation, as required by claim 5. Brief at 18. The first reason, which is that the loan surcharges are not "directly related to the rate of inflation," fails for the reasons already addressed. The second reason is that the surcharges were not a part of the loan account because they were "payable immediately by borrowers as additional interest; the outstanding debt was not, however, written up." Mukherjee at 68, 2d para. This argument is unconvincing because the phrase "not . . . written up" does not mean that the bank failed to keep a record of the loan surcharges; we understand it to mean that the initial loan agreement was not altered, replaced, or supplemented by another written loan agreement. Moreover, we hereby take official notice under Ahlert that it was routine bank practice for the bank to keep a record of the amounts, due dates, and payment dates of all activities affecting loan and deposit accounts. The record of loan surcharges corresponds to the inflation-determined accrual component recited in claim 5.

For the foregoing reasons, the rejection of claims 4 and 5 is affirmed.

The rejection of claim 6, which is dependent on claim 4, rejected over the same prior art as claim 4, and not separately argued, is affirmed for the same reasons as the rejection of claim 4. 37 CFR § 1.192(c) (2001).

Claim 7, which depends on claim 1, specifies that "said deposit account is payable on demand to each depositor." The examiner addresses this claim in two different ways. One is to argue that Mukherjee's 'A' and 'B' accounts were "on demand" accounts despite the one-year

restriction on withdrawals. Mukherjee at 51, 2d full para. We agree with appellants (Brief at 19) that an "on demand" account can have no restrictions on withdrawals. See American Heritage Dictionary 350 (copy enclosed) (defining "demand deposit" to mean "[a] bank deposit that can be withdrawn by the depositor immediately and without advance notice."). The examiner alternatively argued that it would have been obvious to offer the indexed deposit accounts as "on demand" accounts in order to attract more deposits. Final Action at 9. Appellant has not responded to this position, which strikes us as a reasonable one. The rejection of claim 7 is therefore affirmed.

The rejection of claim 8, which is dependent on claim 1, rejected over the same prior art as claim 1, and not separately argued, is also affirmed. 37 CFR § 1.192(c) (2001).

Independent claim 9 reads as follows:

> 9. A method for an institution to manage at least part of a program to provide a depositor of finds with a rate of return on said funds variable with a rate of inflation, comprising:
>
> providing a deposit account by the institution for receiving said funds from said depositor;
>
> allocating at least a portion of said funds for obtaining an asset whose rate of return adjusts with inflation;
>
> using said allocated funds to obtain an asset whose return adjusts with inflation and is determined using a dataprocesssor [sic], said asset comprising a financial instrument having an obligated rate of return indexed to a rate of inflation; and
>
> paying said depositor a rate of return on funds relived [[9]] based on a rate of inflation.

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[9] This word is "received" in claim 42 (renumbered on issuance as patent claim 9) in the "Supplemental Response" faxed to the USPTO on September 17, 1999, in Application 09/184,752.

This claim does not employ either of claim 1's phrases "as a function of a rate of inflation" and "responsive to a rate of inflation," which appellant has unsuccessfully argued require a continuous relationship between the inflation adjustments and the inflation rate. Appellant has not explained, nor is it apparent to us, why the language which appears in claim 9 requires such a relationship. The sole effect on claim 9 of the above-discussed definition given at column 3, lines 11-14 is that the phrase "rate of inflation" is being construed to mean "rate of prior actual inflation."

Reading claim 9 onto inflation-adjusted accounts like those disclosed in Mukherjee as implemented in view of Musmanno on a data processor, the steps of "providing a deposit account by the institution for receiving said funds from said depositor" and "paying said depositor a rate of return on funds relived [sic] based on a rate of inflation" read on Mukherjee's 'A' and 'B' deposit accounts as well as on the initially proposed accounts.

The examiner reads the steps of "allocating at least a portion of said funds for obtaining an asset whose rate of return adjusts with inflation" and "using said allocated funds to obtain an asset . . . comprising a financial instrument having an obligated rate of return indexed to a rate of inflation" on Mukherjee's discussion (at 61-62) of bonds issued by mortgage banks and industry. Final Action at 10, ¶ 16. These bonds were tied to the wholesale price index or its subindex or the export price index. Mukherjee at 61. Mukherjee explains that "[b]anks and cooperative credit societies needed the income from index bonds to help pay compensation on indexed deposit accounts." Id. at 59, 1st full para. While Mukherjee does not state that the money used by a bank to purchase the indexed bonds came from the bank's indexed deposit accounts, such a

financing arrangement would have been obvious in view of the disclosed relationship between the indexed deposit and loan accounts. The rejection of claim 9 is therefore affirmed.

In addition, we note that rather than responding to the examiner's reading of the claimed "asset" on the indexed bonds issued by mortgage banks and industry, appellant's arguments incorrectly assume the examiner is reading the claimed "asset" on the indexed loan accounts described at pages 50, 51, and 67-69 of Mukherjee. Brief at 19-21. We have considered appellant's arguments on this question and conclude that the claimed "asset" alternatively reads on those indexed loan accounts. Appellant does not deny that a loan agreement constitutes an asset comprising a financial instrument having an obligated rate of return, as required by the claim. Instead, appellant argues the rates of return on Mukerhjee's indexed loans are not "indexed to a rate of inflation," which argument is unconvincing for the reasons given above in the discussion of claim 1's requirement that the rate of return on the loan accounts be responsive to a rate of inflation. The rejection of claim 9 is therefore additionally being affirmed on this alternative ground.

Claim 10 depends on claim 9 and recites the additional step of "periodically accounting for a portion of said rate of return of said financial instrument to said allocated funds." The examiner contends that periodic accounting would have been inherent "since all banks MUST have performed accounting to satisfy regulators." Final Action at 12; Answer at 11. Appellant contends that "any inherency argument is misplaced and must be supported by some evidence if it is to be maintained." Brief at 21. We do not agree with appellant. That U.S. banks were and are required to provide a periodic accounting of their accounts to regulators is appropriate subject

matter for official notice under Ahlert. Furthermore, even apart from regulatory requirements, a bank would inherently have to employ periodic accounting in order to service its accounts and to track its own investments. Appellant asserts that it "will not concede that the Answer's position [that periodic accounting was required by regulators] is correct – it may well have been that account holders received information about their accounts 'on demand' only when they requested the information, and it may well have been that they were not periodically notified by the financial institution." Reply brief at 8. This argument incorrectly construes the claim as requiring that the results of the recited periodic accounting be reported to the account holders.

The rejection of claim 10 is therefore affirmed.

Claim 11, which depends on claim 10, specifies that the "financial instrument ha[s] a principal component and an accrual component, whereby said retiring step includes the substeps of redeeming the principal component and the accrual component." As the patentability of this claim, which is rejected over the same prior art as claim 10, is not separately argued, its rejection is affirmed for the same reasons as the rejection of claim 10. 37 CFR § 1.192(c) (2001).

Claim 12 depends on claim 11 and specifies that "the principal component is periodically adjusted based on a rate of inflation," while claim 13, which also depends on claim 11, specifies that "the accrual component is periodically adjusted based on a rate of inflation." Regarding claim 12 (adjusting the principal component based on inflation), the examiner cites two passages in Mukherjee. Final Action at 12-13, ¶ 19. One passage is Mukherjee's statement that "capital was increased by as many as 2 full per cents as the index had risen." Because this statement refers to indexed deposit accounts rather than indexed loans or bonds, this passage is less

pertinent than the other passage on which the examiner relies, which explains that principal component of Karelian indemnity bonds was adjusted in response to inflation: "The method chosen was to increase the principal by 10 per cent for every 10 per cent rise in the domestic wholesale price index." Id. at 57, 3d para. Although not relied on by the examiner, Mukherjee also describes indexed government bonds whose amortization (i.e., principal) component and interest (i.e., accrual) component are adjusted in response to inflation, thus satisfying claims 12 and 13:

> However, the 5 per cent bond of May 1955, issued for public subscription, was the only government bond (other than those associated with the Karelian indemnity issues) to carry a full index clause, in the sense that rises in the index were to cause matched rises (per cent for per cent) in amortisation and interest payments. . . . After the full index link of 1955, this form of inflation-proofing was abandoned in favour of one less attractive to the buyer but safer for the seller. The '50 per cent clause' meant that a rise of 2 per cent in the index brought only a 1 per cent rise in amortisation and interest payments.

Mukherjee at 59-60. Claim 13 (adjusting the accrual component based on inflation) additionally reads on the loan surcharges described at pages 50 and 51 of Mukherjee. In view of the above teachings, appellant is incorrect to argue that "[t]here is no evidence to address the question of whether Mukherjee teaches adjusting the principal component or adjusting the accrual component." Brief at 22. Furthermore, appellant's '673 patent admits that it was known in the art to link either the principal component or the accrual component of an indexed bond to inflation. Specifically, under the heading "2. Description of the Prior Art," the patent describes a first indexed mortgage loan instrument in which the "mortgage balance" (i.e., principal component) is linked to inflation (col. 1, l. 63 to col. 2, l. 66) and a second indexed mortgage

loan instrument in which a variable interest component is linked to inflation. Id. at col. 2, ll. 5-11. We agree with the examiner that it would have been obvious in view of Mukherjee considered in view of Musmanno for a bank to offset the costs of indexed deposit accounts either by investing in indexed bonds or by offering indexed loans, with the principal component or the interest component of the bonds or loans being linked to inflation. The rejection of claims 12 and 13 is therefore affirmed.

The rejection of claims 14-21, which are dependent on claims addressed above, rejected over the same prior art as those claims, and not separately argued, is also affirmed.

Independent claim 22, which reads as follows, differs from claim 9 by identifying the indexed asset as a mortgage loan secured by real estate:

> 22. A method of an institution to manage at least part of a program to provide a depositor of funds a rate of return on said funds variable with a rate of inflation, comprising:
> providing a deposit account by the institution for receiving said funds from said depositor;
> allocating at least a portion of said funds for obtaining an asset whose rate of return adjusts with inflation, said adjustments being determined using a data processor;
> using said allocated funds to obtain said asset whose return adjusts with inflation, said asset comprising a mortgage secured by real estate; and
> paying said depositor a rate of return on funds received based on a rate of inflation.

The term "mortgage," which is not defined in the specification, has the following meanings: "1. A temporary and conditional pledge of property to a creditor as security against a debt. 2. A contract or deed specifying the terms of such a pledge. 3. The claim that the mortgagee or creditor has upon property pledged in this manner." American Heritage Dictionary 855 (copy

enclosed). The claim thus reads on a bank which uses the deposits from indexed deposit accounts to provide indexed loans to borrowers who pledge real estate as security for those loans, as evidenced by a mortgage. We agree with appellant that the examiner is incorrect to read the recited "asset" on indexed bonds issued by mortgage banks, Final Action at 17-18, ¶ 29), because the indexed bonds are not indexed mortgages. Brief at 22-23. However, in view of Mukherjee's teaching of using indexed loans to help pay for indexed deposits (e.g., Mukherjee at 5-51), it would have been obvious for a bank to offer indexed mortgage loans as one way to help pay for indexed deposit accounts.

The rejection of claim 22 is therefore affirmed.

The rejection of claims 23 and 24, which are dependent on claim 22, rejected over the same prior art as claim 22, and not separately argued, is also affirmed.

J. The merits of the rejection of claims 15 and 25-28 for obviousness over Mukherjee in view of Musmanno and further in view of Weiner

Claim 15 depends on claim 9 through claim 14. As noted above, the rejection of claims 14 and 15 based on Mukherjee in view of Musmanno was affirmed along with the rejection of claim 9 because claims 14 and 15 were not separately argued. The rejection of claim 15 based on Mukherjee in view of Musmanno and further in view of Weiner is not separately argued and is therefore also affirmed.

Independent claim 25 reads as follows:

> 25. A method for an institution to manage at least pat [sic] of a program to provide a depositor of funds a rate of return on said funds comprising:
> providing a deposit account by the institution for receiving said funds from said depositor;

paying said depositor a rate of return on funds received based on a rate of inflation;
allocating at least a portion of said funds for obtaining an asset whose rate of return adjusts with inflation;
using said allocated funds to obtain said asset whose value adjusts with inflation, said asset comprising a financial instrument having a principal component periodically adjusted for inflation using a data processor and an accrual component including an interest rate fixed for a term;
said financial instrument
paying interest payments based on the inflation adjusted principal component; [and]
paying the inflation-adjusted principal component at the end of the term.

This claims differs from the previously discussed claims by calling for paying the entire inflation-adjusted principal component at the end of the term, which the examiner refers to as a "balloon payment" of principal. Final Action at 20-21, ¶ 33. As evidence that balloon payments of principal were known, the examiner cites Weiner's description of various payment options for home equity loans. We assume the examiner is relying on Weiner's explanation that "[t]he most flexible plan calls for monthly interest payments, with no minimum payment of principle [sic] required. In these plans, the principle is usually due in five to ten years." Weiner at 2d page, under the heading "Scheduling repayment." We agree with the examiner that it would have been obvious for a bank to combine Weiner's teaching of permitting a balloon repayment of principal with Mukherjee's teaching of indexing the principal loan component to inflation in order to accommodate the needs or preferences of borrowers. Final Action at 20-21, ¶ 33. Appellant's complaint that Weiner is not concerned with indexed loans, Brief at 24, is unconvincing because

nonobviousness cannot be established by attacking references individually where the rejection is based upon the combined teachings of a plurality of references. In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981). We are therefore affirming the rejection of claim 25.

The rejection of claims 26-28, which are dependent on claim 25, rejected over the same prior art as claim 25, and not separately argued, is also affirmed.

K. Summary

Both of the rejections have been affirmed with respect to all of the rejected claims.

L. Extensions of time

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a). See 37 CFR §§ 41.50(f) and 41.52(b).

AFFIRMED

John C. Martin JOHN C. MARTIN Administrative Patent Judge	
Howard B. Blankenship HOWARD B. BLANKENSHIP Administrative Patent Judge	BOARD OF PATENT APPEALS AND INTERFERENCES
Allen MacDonald ALLEN R. MacDONALD Administrative Patent Judge	

JCM/jcm

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Enclosures:

(a) The American Heritage Dictionary of the English Language 350, 373, 855 (New College Edition, 1975).

(b) Santosh Mukherjee and Claire Orlans, Indexation in an Inflationary Economy – A Case Study of Finland, Vol. XL, Broadsheet No. 551, PEP The Social Science Institute, April 1975, at 50-73 and 106-11.

(c) Margaret L. Lial, E. John Hornsby, Jr., and David I. Schneider, College Algebra 236-37 (7th ed. 1997).

(d) Webster's Third New International Dictionary of the English Language – Unabridged 2237 (1971 ed.).

1975

THE AMERICAN HERITAGE
I ONARY
OF THE ENGLISH LANGUAGE

WILLIAM MORRIS, Editor

Published by

AMERICAN HERITAGE PUBLISHING CO., INC.

and

HOUGHTON MIFFLIN COMPANY

BOSTON/NEW YORK/ATLANTA/GENEVA, ILLINOIS/DALLAS/PALO ALTO

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Standard Book Numbers: 395-09064-4 (de luxe edition);
395-09065-2 (plain edges); 395-09066-0 (thumb-indexed);
395-09070-9 (school edition)

Library of Congress Catalog Card Number 76-86995

Manufactured in the United States of America

Computer-composed by Inforonics, Inc.
in Maynard, Massachusetts

delivery room. A room in a hospital equipped for delivering babies.
dell (dĕl) *n.* A small, secluded wooded valley. [Middle English *del,* Old English *dell.* See **dhel-** in Appendix.*]
del·la Rob·bia (dĕl′lä rôb′byä). An Italian family of Florentine sculptors, including **Luca** (1400?–1482); his nephew **Andrea** (1437–1528); and his grandnephew **Giovanni** (1469–1529?).
dells (dĕlz) *pl.n.* The rapids of a river.
Del·mar·va Peninsula (dĕl-mär′və). A peninsula between Chesapeake Bay and the Atlantic, comprising most of Delaware and parts of Maryland and Virginia. [DEL(AWARE) + MAR(YLAND) + V(IRGINI)A.]
Del·mon·i·co steak (dĕl-mŏn′ĭ-kō′) *n.* A small, often boned steak from the front section of the short loin of beef. Also called "club steak." [After the *Delmonico* Restaurant, New York City, which was founded by Lorenzo *Delmonico* (1813–1881).]
de·lo·cal·ize (dē-lō′kə-līz′) *tr.v.* **-ized, -izing, -izes. 1.** To remove (something) from its native or usual locality. **2.** To broaden the range or scope of. —**de·lo′cal·i·za′tion** *n.*
De Long (də lông′, lŏng′), **George Washington.** 1844–1881. American naval officer and explorer of the Arctic.
De·lorme (də-lôrm′), **Philibert.** Also **de l'Orme.** 1515?–1570. French court architect of the Tuileries.
De·los (dē′lŏs). The smallest island of the Cyclades, Greece; the traditional birthplace of Apollo and Artemis.
de·louse (dē-lous′) *tr.v.* **-loused, -lousing, -louses.** To rid of parasitic infestation by physical or chemical means.
Del·phi (dĕl′fī′). An ancient town of central Greece, on the southern slope of Mount Parnassus; seat of an oracle of Apollo.
Del·phic (dĕl′fĭk). Also **Del·phi·an** (-fē-ən). **1.** Of or pertaining to Delphi or to the oracle of Apollo at Delphi. **2.** Ambiguous; obscure in meaning; oracular.
del·phin·i·um (dĕl-fĭn′ē-əm) *n.* Any plant of the genus *Delphinium;* especially, any of several tall cultivated varieties having spikes of showy, variously colored spurred flowers. See **larkspur.** [New Latin *Delphinium* (genus), from Greek *delphinion,* larkspur, diminutive of *delphis* (stem *delphin-*), DOLPHIN (from the shape of the nectary).]

delphinium

Del·phi·nus (dĕl-fī′nəs) *n.* A constellation in the Northern Hemisphere near Pegasus and Aquila. [New Latin, from Latin *delphīnus,* DOLPHIN.]
del·ta (dĕl′tə) *n.* **1.** The fourth letter in the Greek alphabet, written Δ, δ. Transliterated in English as *d, D.* See **alphabet. 2. a.** A usually triangular alluvial deposit at the mouth of a river. **b.** A similar deposit at the mouth of a tidal inlet, caused by tidal currents. **3.** Anything resembling the shape of a triangle. **4.** *Mathematics.* A finite increment in a variable. [Middle English, from Greek, from Semitic, akin to Hebrew *dāleth.*] —**del·ta′ic** (-tā′ĭk), **del′tic** *adj.*
delta ray. 1. An electron ejected from matter by ionizing radiation. **2.** The track of such an electron in a nuclear emulsion or cloud-chamber photograph.
delta wing. An aircraft with sweptback wings that give it the appearance of an isosceles triangle.
del·toid (dĕl′toid′) *n.* A thick, triangular muscle covering the shoulder joint, used to raise the arm from the side. —*adj.* **1.** Triangular. **2.** Pertaining to the deltoid. [New Latin *deltoides,* from Greek *deltoeidēs,* triangular : DELTA + -OID.]
de·lude (dĭ-lōōd′) *tr.v.* **-luded, -luding, -ludes. 1.** To deceive the mind or judgment of; mislead. **2.** *Obsolete.* To elude or evade. **3.** *Obsolete.* To frustrate the hopes or plans of. —See Synonyms at **deceive.** [Middle English *deluden,* from Latin *dēlūdere,* to play false, deceive : *dē-* (pejorative) + *lūdere,* to play, from *lūdus,* game (see **leid-** in Appendix*).] —**de·lud′a·ble** *adj.* —**de·lud′er** *n.* —**de·lud′ing·ly** *adv.*

delta
The delta of the Nile photographed from a Gemini space flight

del·uge (dĕl′yōōj) *tr.v.* **-uged, -uging, -uges. 1.** To overrun with water. **2.** To inundate in overwhelming numbers. —*n.* **1.** A great flood; heavy downpour. **2.** Anything that overwhelms as if by a great flood. —**the Deluge.** The great flood that occurred in the time of Noah. Genesis 7–10. [Middle English, from Old French, from Latin *diluvium,* flood, from *diluere,* to wash away : *dis-,* apart + *-luere,* from *lavere,* to wash (see **lou-** in Appendix*).]
de·lu·sion (dĭ-lōō′zhən, dĭ-lyōō′-) *n.* **1. a.** The act or process of deluding; deception. **b.** The state of being deluded. **2.** A false belief held in spite of invalidating evidence. See Usage note below. [Middle English *delusioun,* from Latin *dēlūsio,* from *dēlūdere* (past participle *dēlūsus*), DELUDE.] —**de·lu′sion·al** *adj.*
Usage: *Delusion* and *illusion* are seldom interchangeable, though closely related. *Delusion* refers to false belief held without reservation as a result of self-deception, the imposition of another, or mental disorder. It is the stronger term, often associated with harm. *Illusion* is applicable to a false impression, frequently based on fancy or on wishful thinking, or to a false perception (such as an optical illusion) that one eventually recognizes as false.
de·lu·sive (dĭ-lōō′sĭv) *adj.* Also **de·lu·so·ry** (-lōō′sə-rē). **1.** Tending to deceive or mislead; deceptive. **2.** Having the nature of a delusion; false. —See Synonyms at **misleading.** —**de·lu′sive·ly** *adv.* —**de·lu′sive·ness** *n.*
de luxe (dĭ lŏŏks′, dĭ lŭks′). Also **de·luxe. 1.** Of special elegance or luxury; sumptuous: *a de luxe model.* **2.** In an elegant or luxurious manner; sumptuously. [French, "of luxury."]
delve (dĕlv) *v.* **delved, delving, delves.** —*intr.* **1.** To search deeply and laboriously. **2.** *Archaic.* To dig the ground, as with a spade. —*tr. Archaic.* To dig (ground) with a spade. [Middle English *delven,* to dig, Old English *delfan.* See **dhelbh-** in Appendix.*] —**delv′er** *n.*
Dem. Democrat; Democratic.
de·mag·net·ize (dē-măg′nə-tīz′) *tr.v.* **-ized, -izing, -izes.** To remove magnetic properties from. —**de·mag′net·i·za′tion** *n.*
dem·a·gog·ic (dĕm′ə-gŏj′ĭk) *adj.* Also **dem·a·gog·i·cal** (-ĭ-kəl). Relating to, of the nature of, or characteristic of a demagogue. —**dem′a·gog′i·cal·ly** *adv.*
dem·a·gogue (dĕm′ə-gŏg′, -gôg′) *n.* Also **dem·a·gog. 1.** A leader who obtains power by means of impassioned appeals to the emotions and prejudices of the populace. **2.** A leader of the common people in ancient times. [Greek *dēmagōgos,* popular leader : *dēmos,* common people (see **dā-** in Appendix*) + *agōgos,* leading, from *agein,* to lead (see **ag-** in Appendix*).]
dem·a·gogu·er·y (dĕm′ə-gŏ′gə-rē, -gŏg′ə-rē) *n.* The practices or rhetoric of a demagogue. Also called "demagogism."
dem·a·go·gy (dĕm′ə-gō′jē, -gŏ′jē, -gŏj′ē) *n.* The quality or character of demagogues.
de·mand (dĭ-mănd′, -mänd′) *v.* **-manded, -manding, -mands.** —*tr.* **1.** To ask for urgently or firmly, leaving no chance for refusal or denial. **2.** To claim as just or due. **3.** To ask to be informed of: *demand the cause of his action.* **4.** To need or require as useful, just, proper, or necessary. **5.** *Law.* **a.** To summon to court. **b.** To claim formally; lay legal claim to. —*intr.* To make a demand. —See Usage note below. —*n.* **1.** The act of demanding. **2.** Something that is demanded. **3. a.** The state of being sought after. **b.** An urgent requirement, need, or claim: *an increased demand for capital goods.* **4.** *Archaic.* An emphatic question or inquiry. **5.** *Law.* A formal claim. **6.** *Economics.* **a.** The desire to possess something combined with the ability to purchase it. **b.** The amount of any commodity that people are ready and able to buy at a given time for a given price. —**on demand.** On presentation. [Middle English *demaunden,* from Old French *demander,* to ask, charge with doing, from Latin *dēmandāre,* to give in charge, entrust : *dē-* (intensive) + *mandāre,* to entrust (see **man-**[2] in Appendix*).] —**de·mand′a·ble** *adj.* —**de·mand′er** *n.*
Usage: *Demand* (verb) is commonly followed by a direct object in the form of a word (*demand payment*) or clause (*demand that he go*), or by an infinitive (*demand to know why*). The object is often followed by *of* or *from: demand much of* (or *from*) *him.* In a parallel construction, *demand* (noun) is followed by *on: make a demand on him.*
demand deposit. A bank deposit that can be withdrawn by the depositor immediately and without advance notice.
de·mand·ing (dĭ-măn′dĭng, dĭ-män′-) *adj.* **1.** Making rigorous demands. **2.** Requiring careful attention or constant effort. —See Synonyms at **burdensome.** —**de·mand′ing·ly** *adv.*
demand note. A bill or draft payable in lawful money on presentation or demand.
de·mand-pull (dĭ-mănd′pŏŏl′, dĭ-mänd′-) *adj.* Designating a type of inflation in which increased demand for a limited amount of goods and services tends to drive up prices. Compare **cost-push.**
de·man·toid (dĭ-măn′toid′) *n.* A transparent, green variety of garnet, used as a gem. [German *Demantoid* : *Demant* (obsolete), diamond, from Middle High German *diemant,* from Old French *diamant,* DIAMOND + -OID.]
de·mar·cate (dĭ-mär′kāt′, dē′mär-kāt′) *tr.v.* **-cated, -cating, -cates. 1.** To set the boundaries of; delimit. **2.** To separate clearly as if by boundaries; discriminate. [Back-formation from DEMARCATION.] —**de·mar′ca′tor** (-kā′tər) *n.*
de·mar·ca·tion (dē′mär-kā′shən) *n.* Also **de·mar·ka·tion. 1.** The setting or marking of boundaries or limits. **2.** A separation; distinction. Usually used in the phrase *line of demarcation.* [Spanish *demarcación,* from *demarcar,* to mark out the boundary : *de-,* completely + *marcar,* to mark, from Italian *marcare,* from Old Italian, from Germanic (see **merg-** in Appendix*).]
dé·marche (dā-märsh′) *n. French.* **1.** A proceeding; maneuver; step. **2.** A diplomatic representation or protest. **3.** A statement or protest addressed by citizens to public authorities.
de·ma·te·ri·al·ize (dē′mə-tĭr′ē-ə-līz′) *v.* **-ized, -izing, -izes.** —*tr.* To divest of material qualities or characteristics. —*intr.* To lose material character or form. —**de′ma·te′ri·al·i·za′tion** *n.*
Dem·a·vend, Mount (dĕm′ə-vĕnd′). The highest elevation (18,600 feet) of the Elburz Mountains, northern Iran.
deme (dēm) *n.* **1.** One of the townships of ancient Attica. **2.** *Ecology.* A local, usually stable population of organisms of the same kind or species. [Greek *dēmos,* common people, deme. See **dā-** in Appendix.*]
de·mean[1] (dĭ-mēn′) *tr.v.* **-meaned, -meaning, -means.** To conduct or behave (oneself) in a particular manner. —*n. Archaic.* Behavior; demeanor. [Middle English *demeinen,* from Old French *demener* : *de-,* completely + *mener,* to lead, conduct, from Latin *mināre,* to drive (herds), from *minārī,* to threaten, from *minae,* threats (see **men-**[2] in Appendix*).]
de·mean[2] (dĭ-mēn′) *tr.v.* **-meaned, -meaning, -means. 1.** To debase in dignity or stature. **2.** To humble (oneself). —See Synonyms at **degrade.** [DE- (pejorative) + MEAN (base).]
de·mean·or (dĭ-mē′nər) *n.* Also *British* **de·mean·our.** The way in which a person behaves or conducts himself; deportment; manner. See Synonyms at **bearing.**
de·ment (dĭ-mĕnt′) *tr.v.* **-mented, -menting, -ments.** To make insane. [Late Latin *dēmentāre,* from Latin *dēmēns,* mad : *dē-* (undoing) + *mēns,* mind (see **men-**[1] in Appendix*).]
de·ment·ed (dĭ-mĕn′tĭd) *adj.* **1.** Insane. **2.** Afflicted with dementia. —**de·ment′ed·ly** *adv.* —**de·ment′ed·ness** *n.*
de·men·tia (dĭ-mĕn′shə, -shē-ə) *n.* Irreversible deterioration of intellectual faculties with concomitant emotional disturbance resulting from organic brain disorder. See Synonyms at **insanity.** [Latin *dēmentia,* madness, from *dēmēns,* mad. See **dement.**]

dip·so·ma·ni·a (dĭp'sə-mā'nē-ə, -mān'yə) *n.* An insatiable, often periodic craving for alcoholic liquors. [New Latin : Greek *dipsa*, thirst (see **dipsas**) + -MANIA.] —**dip'so·ma'ni·ac, dip'so·ma·ni'a·cal** (-mə-nī'ĭ-kəl) *adj.* —**dip'so·ma'ni·ac** *n.*

dip·stick (dĭp'stĭk') *n.* A graduated rod for measuring the depth or amount of liquid in a container, as of oil in a crankcase.

dip·ter·an (dĭp'tər-ən) *n.* Also **dip·ter·on** (-tə-rŏn'). A dipterous insect. —*adj.* Of or belonging to the order Diptera; dipterous. [From New Latin *Diptera*, plural of *dipterus*, DIPTEROUS.]

dip·ter·ous (dĭp'tər-əs) *adj.* **1.** Of, pertaining to, or belonging to the Diptera, a large order of insects which includes the true flies and mosquitoes, characterized by a single pair of membranous wings and a pair of club-shaped balancing organs called halteres. **2.** *Botany.* Having two winglike parts: *the dipterous fruit of the maple.* [New Latin *dipterus*, from Greek *dipteros*, having two wings : DI- + -PTEROUS.]

dip·tych (dĭp'tĭk) *n.* **1.** An ancient writing tablet having two leaves hinged together. **2.** A pair of painted or carved panels hinged together. [Late Latin *diptycha*, from Greek *diptukha*, from *diptukhos*, double-folded : DI- + *ptukhē*, a fold, from *ptussein*, to fold (see **spi** in Appendix*).]

dir. director.

Di·rac (dĭ-răk'), **Paul Adrien Maurice.** Born 1902. British theoretical physicist; a founder of quantum electrodynamics.

dire (dīr) *adj.* **direr, direst.** Having dreadful or terrible consequences; calamitous; disastrous. See Synonyms at **sinister.** [Latin *dīrus*, fearful, ill-omened. See **dwei-** in Appendix.*] —**dire'ly** *adv.* —**dire'ness** *n.*

di·rect (dĭ-rĕkt', dī-) *v.* **-rected, -recting, -rects.** —*tr.* **1.** To conduct the affairs of; manage; regulate. **2.** To take charge of with authority; control. **3.** To conduct (musicians) in a musical rehearsal or performance. **4.** To move (something or someone) toward a goal; aim; point. **5.** To give instructions to (someone) for finding a place. **6.** To address to a destination. **7.** To address to a person or audience. **8. a.** To give guidance and instruction to (actors) in the rehearsal and performance of a play or the filming of a motion picture. **b.** To supervise the performance of actors in. —*intr.* **1.** To give commands or directions. **2.** To conduct a performance or rehearsal. —See Synonyms at **command, conduct.** —*adj.* **1.** Proceeding or lying in a straight course or line; not deviating or swerving. **2.** Straightforward; candid; frank. **3.** Without intervening persons, conditions, or agencies; immediate. **4.** By action of the voters, rather than through elected representatives or delegates. **5.** Of unbroken descent; lineal. **6.** Consisting of the exact words of the writer or speaker. **7.** Absolute; total: *direct opposites.* **8.** *Mathematics.* Varying in the same manner as another quantity; especially, increasing if another quantity increases or decreasing if it decreases. Compare **inverse.** **9.** *Astronomy.* Designating a west-to-east motion of a planet in the same direction as the sun's movement among the stars. —*adv.* In a direct manner; straight; directly. See Usage note below. [Middle English *directen*, from Latin *dīrigere* (past participle *dīrectus*), to arrange in distinct lines, direct : *dis-*, apart + *regere*, to guide (see **reg-**[1] in Appendix*).]

Usage: *Direct* (adverb) and *directly* are interchangeable in the senses of in a direct line or manner, or straight (*went direct*, or *directly, to Atlanta*), and in the sense of without anyone or anything intervening (*direct*, or *directly, from manufacturer to buyer*). In all other senses of *directly*, listed at that word, the use of *direct* is not possible.

direct action. The use of strikes, demonstrations, and sabotage to achieve an end. —**direct actionist.**

di·rect-ac·tion (dĭ-rĕkt'ăk'shən, dī-rĕkt'-) *adj.* Operating without intermediate ingredients, components, stages, or processes.

direct current. *Abbr.* **dc** An electric current flowing in one direction.

directed angle. An angle having an indicated positive sense.

directed distance. A segment of a line having an indicated positive sense.

di·rec·tion (dĭ-rĕk'shən, dī-) *n.* **1.** The act or function of directing. **2.** Management, supervision, or guidance of some action or operation. **3.** The art or action of musical or theatrical directing. **4.** A word or phrase in a musical score indicating how a particular passage is to be played or sung. **5.** *Usually plural.* An instruction or series of instructions for doing something. **6.** An order or command; authoritative indication. **7. a.** The distance-independent relationship between two points that specifies the angular position of either with respect to the other; the relationship by which the alignment or orientation of any position with respect to any other position is established. **b.** A position to which motion or another position is referred. **c.** A line leading to a place or point. **d.** The line or course along which a person or thing moves. **8.** The statement, in degrees, of the angle measured between due north and a given line or course on a compass. **9.** A course or area of development; tendency toward a particular end or goal. [Middle English, arrangement, management, from Old French, from Latin *dīrectiō*, from *dīrigere*, to DIRECT.]

di·rec·tion·al (dĭ-rĕk'shən-əl, dī-) *adj.* Of or pertaining to spatial direction, especially a single specified direction. —**di·rec'tion·al'i·ty** *n.*

directional antenna. An antenna adapted for receiving signals from or sending signals in a particular direction.

directional signal. One of two flashing lights on an automobile that indicates the direction of a turn. Also called "directionals."

direction finder. A device for determining the source of a transmitted signal, consisting mainly of a radio receiver and a coiled rotating antenna. Often called "radio direction finder."

direction indicator. A compass used in airplane navigation to compare an intended heading to the actual heading.

di·rec·tive (dĭ-rĕk'tĭv, dī-) *n.* An order or instruction, especially one issued by a government or military unit. —*adj.* Serving to direct, indicate, or point out; directing.

di·rect·ly (dĭ-rĕkt'lē, dī-) *adv.* **1.** In a direct line or manner; straight. See Usage note at **direct.** **2.** Without anyone or anything intervening; immediately. See Usage note at **direct.** **3.** Exactly; totally; absolutely. **4.** At once; instantly. —See Synonyms at **immediately.** —*conj. Chiefly British.* As soon as: *We'll go, directly he's ready.*

direct object. In English and some other languages, the word or words in a sentence designating the person or thing receiving the action of a transitive verb. The direct object in English is usually a noun, nominal clause or phrase, or pronoun and generally follows a verb. In *The boy broke the dish,* the direct object is *the dish.* See **object.**

Di·rec·toire (dē-rĕk-twär') *n.* The Directory (*see*). —*adj.* Of or in the style characteristic of the Directory period in France.

di·rec·tor (dĭ-rĕk'tər, dī-) *n. Abbr.* **dir.** **1.** One who supervises, controls, or manages. **2.** A member of a board of persons who control or govern the affairs of an institution or corporation. **3. a.** One whose profession is the supervision and instruction of the actors in a dramatic production. **b.** The conductor of an orchestra or chorus. —**di·rec'tor·ship'** *n.*

di·rec·tor·ate (dĭ-rĕk'tər-ĭt, dī-) *n.* **1.** The office or position of a director. **2.** A board of directors.

di·rec·to·ri·al (dĭ-rĕk'tôr'ē-əl, -tōr'ē-əl, dī-) *adj.* **1.** Of or pertaining to a director or directorate. **2.** Serving to direct; directive. —**di·rec'to'ri·al·ly** *adv.*

di·rec·to·ry (dĭ-rĕk'tə-rē, dī-) *n., pl.* **-ries.** **1.** One that directs. **2.** A book listing names, addresses, and other data about a specific group of persons or organizations. **3.** A book of rules or directions, especially for use in church worship. **4.** A group or body of directors; directorate. —*adj.* Serving to direct.

Di·rec·to·ry (dĭ-rĕk'tə-rē, dī-) *n.* The executive body in charge of the French government from 1795 to 1799. Also called "Directoire."

direct primary. A preliminary election in which a party's candidates for public office are nominated by popular vote.

di·rec·tress (dĭ-rĕk'trĭs, dī-) *n.* A female director.

di·rec·trix (dĭ-rĕk'trĭks, dī-) *n., pl.* **-trixes** or **directrices** (dī'rĕk-trī'sēz). **1.** *Geometry.* The fixed curve traversed by a generatrix in generating a conic or a cylinder. **2.** *Military.* The median line in the trajectory of fire. [New Latin, "directress," from Late Latin *director*, DIRECTOR.]

direct tax. A tax, such as an income or property tax, levied directly on the taxpayer.

dire·ful (dīr'fəl) *adj.* Dreadful; frightful; dire. —**dire'ful·ly** *adv.* —**dire'ful·ness** *n.*

dirge (dûrj) *n.* **1.** A funeral hymn or lament. **2.** *Ecclesiastical.* The office for the dead; a funeral service that is sung. [Middle English *dirige, derge,* from the first word in Medieval Latin *dirige, Domine, Deus meus, in conspectu tuo viam meam,* "Direct, O Lord, my God, my way in thy sight" (an antiphon in the office of the dead, adopted from Psalms 5:9), from Latin, singular imperative of *dirigere*, to DIRECT.] —**dirge'ful** *adj.*

dir·ham (də-răm') *n.* The basic monetary unit of Morocco, equal to 100 francs. See table of exchange rates at **currency.** [Arabic *dirham,* from Greek *drakhmē,* DRACHMA.]

dir·i·gi·ble (dĭr'ə-jə-bəl, dĭ-rĭj'ə-bəl) *n.* An early steerable lighter-than-air craft. —*adj.* Able to be guided or steered. [From Latin *dirigere*, to guide, DIRECT.] —**dir'i·gi·bil'i·ty** *n.*

dir·i·ment (dĭr'ə-mənt) *adj.* Rendering totally void; nullifying. Used especially in the phrase *diriment impediment of marriage* to signify any sufficient cause for voiding a marriage in the Roman Catholic Church. [From Latin *dīrimēns*, present participle of *dīrimere*, to take apart, separate, interrupt : *dis-*, apart + *emere*, to take, buy (see **em-** in Appendix*).]

dirk (dûrk) *n.* A dagger. —*tr.v.* **dirked, dirking, dirks.** To stab with a dirk. [Earlier *durk, dork,* probably related to or altered from German *Dolch,* dagger. See **dhelg-** in Appendix.*]

dirn·dl (dûrn'dl) *n.* **1.** A full-skirted dress with a tight bodice, patterned after Tyrolean peasant wear. **2.** A skirt of a similar cut. [German, short for *Dirndlkleid* : *Dirndl*, diminutive of *Dirne*, girl, from Old High German *thiorna*, maid (see **tek-**[1] in Appendix*) + *Kleid*, dress.]

dirt (dûrt) *n.* **1.** Earth or soil. **2.** A filthy or soiling substance, such as mud, dust, or excrement. **3.** Something mean, contemptible, or vile. **4.** Obscene language. **5.** Malicious or scandalous gossip. **6.** Gravel, slag, or other material from which metal is extracted in mining. —*adj.* Made of dirt. [Middle English *dirt*, variant of *drit*, excrement, mud, filth, from Old Norse *drit*, from Germanic *drit-* (unattested).]

dirt-cheap (dûrt'chēp') *adj.* Very cheap. —**dirt'-cheap'** *adv.*

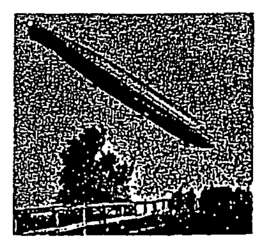
dirt farmer. *Informal.* A farmer who does all his own work.

dirt·y (dûr'tē) *adj.* **-ier, -iest.** **1.** Soiled, as with dirt; grimy; unclean. **2.** Obscene or scatological. **3.** Contemptibly contrary to honor or rules. **4.** Of a clouded or muddy appearance. **5.** Designating a nuclear weapon that produces an excessive amount of radioactive fallout. **6.** Stormy; rough: *dirty weather.* —*v.* **dirtied, -ying, -ies.** —*tr.* To make soiled; stain; tarnish. —*intr.* To become dirty. [Middle English *dritti, dirti,* from *drit*, DIRT.] —**dirt'i·ly** *adv.* —**dirt'i·ness** *n.*

Synonyms: *dirty, filthy, foul, nasty, squalid, soiled, grimy, slovenly, slatternly.* These adjectives apply to what is unclean, impure, or unkempt. *Dirty,* the most general, describes anything physically unclean or offensive to propriety by being off-color. *Filthy* intensifies these senses, as does *foul,* which suggests

dirk

diptych
Fourteenth-century Italian ivory



dirigible
Landing at Mineola, New York, in July 1919

ley). **5.** Fought to the death: "*with victorious Germany and Italy engaged in mortal attack upon us*" (Winston Churchill). **6.** Unrelenting; implacable: "*Skyris Bolgolam . . . hath been your mortal enemy almost ever since your arrival.*" (Swift). **7.** Of or like the fear of death; dire; grievous: *in mortal terror.* **8.** *Roman Catholic Church.* Entailing or causing spiritual death. Said of sins, crimes, or transgressions: *Suicide is a mortal sin.* Compare **venial. 9.** Explicable in terms of this world; earthly; conceivable: *There is no mortal reason for us to go.* **10.** Very great; extreme: "*I go there a mortal sight of times*" (Dickens). **11.** Very long and tedious: "*Six mortal hours did I endure her loquacity.*" (Scott). —*n.* A human being. —*adv. Regional.* Extremely; very: "*Never had she seen her sister look so mortal pretty.*" (Conrad Richter). [Middle English, from Old French *mortal, mortel,* from Latin *mortālis,* from *mors* (stem *mort-*), death. See **mer-²** in Appendix.*] —**mor'tal·ly** *adv.*

mor·tal·i·ty (môr-tăl'ə-tē) *n., pl.* **-ties. 1.** The condition of being subject to death. **2.** Frequency of number of deaths in proportion to a population; death rate. **3.** Deadliness. **4.** The quality of being mortal. Said of a sin.

mor·tar (môr'tər) *n.* **1.** A receptacle made of a hard material in which substances are crushed or ground with a pestle. **2.** Any machine in which materials are ground and blended or crushed. **3.** *Military.* A muzzle-loading cannon used to fire shells at low velocities, short ranges, and great angular elevation. Also called "trench mortar." **4.** Any of several similar devices used for various purposes, such as shooting life lines across a stretch of water. **5.** A mixture of cement or lime with sand and water that is used in building. —*v.* **mortared, -taring, -tars.** —*tr.* **1.** To plaster or join with mortar. **2.** To bombard with a mortar; hit with mortar shells. —*intr.* To fire mortars. [Middle English *morter,* partly from Old English *mortere* and partly from Old French *mortier,* both from Latin *mortārium,* a mortar and the substance made in it. See **mer-²** in Appendix.*]

mor·tar·board (môr'tər-bôrd', -bōrd') *n.* **1.** A square board with a handle, for holding and carrying mortar. **2.** An academic cap topped by a flat square covered with cloth.

Morte d'Ar·thur, Le (lə môrt' där'thər). A collection of Arthurian stories compiled and translated from Old French by Sir Thomas Malory, and printed by William Caxton in 1485.

mort·gage (môr'gĭj) *n. Abbr.* **mtg., mtge.** *Law.* **1.** A temporary and conditional pledge of property to a creditor as security against a debt. **2.** A contract or deed specifying the terms of such a pledge. **3.** The claim that the mortgagee or creditor has upon property pledged in this manner. —*tr.v.* **mortgaged, -gaging, -gages. 1.** To pledge (property) by mortgage. **2.** To pledge or stake against future success or failure; place an advance liability upon. [Middle English *morgage,* from Old French *mortgage,* "dead pledge" : *mort,* dead, from Latin *mortuus,* from *mors* (stem *mort-*), death (see **mer-²** in Appendix*) + *gage,* GAGE (pledge).]

mort·ga·gee (môr'gĭ-jē') *n.* The holder of a mortgage.

mort·ga·gor (môr'gĭ-jôr', môr'gĭ-jər) *n.* Also **mort·gag·er** (môr'gĭ-jər). A person who mortgages his property.

mor·ti·cian (môr-tĭsh'ən) *n.* A funeral director; undertaker. [MORT(UARY) + -ICIAN.]

mor·ti·fi·ca·tion (môr'tə-fĭ-kā'shən) *n.* **1.** A feeling of shame, humiliation, or wounded pride. **2.** Mortifying of the body and appetites. **3.** The death or decay of one part of a living body; gangrene.

mor·ti·fy (môr'tə-fī') *v.* **-fied, -fying, -fies.** —*tr.* **1.** To cause to experience shame, humiliation, or wounded pride; humiliate. **2.** To discipline (one's body and appetites) by self-denial and austerity: "*to subdue and mortify all lusts and affections*" (George Herbert). **3.** To cause (a bodily part) to die, as by gangrene. —*intr.* **1.** To practice ascetic discipline or punishment of the body. **2.** To become gangrenous or necrosed, as a part of the body. —See Synonyms at **degrade.** [Middle English *mortifien,* from Old French *mortifier,* from Late Latin *mortificāre,* to cause to die : *mors* (stem *mort-*), death (see **mer-²** in Appendix*) + *-ficāre,* -FY.] —**mor'ti·fy'ing** *adj.*

mor·tise (môr'tĭs) *n.* Also **mor·tice. 1.** A cavity, usually rectangular, in a piece of wood, stone, or other material, prepared to receive a similarly shaped projection or tenon *(see)* of another piece, to hold the two together. **2.** *Printing.* A hole cut in a plate for the insertion of type. —*tr.v.* **mortised, -tising, -tises.** Also **mor·tice. 1.** To join or fasten securely, as with a mortise and tenon. **2.** To cut or make a mortise in. **3.** *Printing.* **a.** To cut a hole in (a plate) for the insertion of type. **b.** To cut such a hole and insert (type). [Middle English *mortays,* from Old French *mortoise*†.]

mort·main (môrt'mān') *n. Law.* Perpetual ownership of real estate by institutions such as churches that cannot transfer or sell them. Also called "dead hand." [Middle English *mortemayne,* from Old French *mortemain,* "dead hand" (i.e., institutional possession) : *morte,* feminine of *mort,* dead, from Latin *mortuus,* from *mors* (stem *mort-*), death (see **mer-²** in Appendix*) + *main,* hand, from Latin *manus* (see **man-²** in Appendix*).]

Mor·ton (môrt'n), **Ferdinand Joseph La Menthe** ("**Jelly Roll**"). 1885–1941. American jazz pianist and composer.

Mor·ton (môrt'n), **Levi Parsons.** 1824–1920. Vice President of the United States under Benjamin Harrison (1889–93).

Mor·ton (môrt'n), **Thomas.** 1622?–1647? American colonial leader; established anti-Puritan community.

Mor·ton (môrt'n), **William Thomas Green.** 1819–1868. American dentist; first to use ether as an anesthetic (1846).

mor·tu·ar·y (môr'cho͞o-ĕr'ē) *n., pl.* **-ies.** A place where dead bodies are prepared or kept prior to burial or cremation. —*adj.* Of or pertaining to death or to the burial of the dead. [Middle English *mortuarie,* from Norman French, from Late Latin *mortuārium,* from *mortuārius,* of burial, from Latin *mortuus,* dead, from *mors* (stem *mort-*), death. See **mer-²** in Appendix.*]

mor·u·la (môr'ə-lə) *n., pl.* **-lae** (-lē'). **1.** The spherical embryonic mass of blastomeres formed before complete blastulation. Compare **gastrula. 2.** A spherical mass of developing male gametes occurring especially in certain annelid worms. [New Latin, from Latin *mōrum,* mulberry tree, from Greek *moron.* See **moro-** in Appendix.*] —**mor'u·lar** (-lər) *adj.*

mos. months.

mo·sa·ic (mō-zā'ĭk) *n.* **1.** A picture or decorative design made by setting small colored pieces, such as tile, in mortar. **2.** Anything that resembles a piece of mosaic work: "*I have tried to arrange these chunks and splinters so that they form a sort of personal mosaic.*" (Kenneth Tynan). **3.** A virus disease of plants, resulting in light and dark areas in the leaves, which often become shriveled and dwarfed. **4.** Overlapping photographs, usually aerial, assembled into a composite picture. **5.** A photosensitive surface in the iconoscope of a television camera. —*tr.v.* **mosaicked, -icking, -ics. 1.** To make by mosaic or as if by mosaic. **2.** To adorn with mosaic or as if with mosaic. [Middle English *musycke,* from Old French *mosaique,* from Old Italian *mosaico,* from Medieval Latin *mosaicus, musaicus,* irregularly from Late Greek *mouseion,* a mosaic, from *mouseios,* belonging to the Muses, from *Mousa,* Muse. See **Mousa** in Appendix.*] —**mo·sa'ic** *adj.* —**mo·sa'i·cist** (mō-zā'ə-sĭst) *n.*

Mo·sa·ic (mō-zā'ĭk) *adj.* Also **Mo·sa·i·cal.** Of or pertaining to Moses or the laws and writings attributed to him. [New Latin *Mosaicus,* from MOSES.]

mosaic gold. An alloy resembling gold, **ormolu** *(see).*

Mosaic Law. The ancient law of the Hebrews, traditionally attributed to Moses and contained mainly in the Pentateuch. Also called "Law of Moses."

Mos·by (mōz'bē), **John Singleton.** 1833–1916. American commander of Confederate raiders in the Civil War.

mos·cha·tel (mŏs'kə-tĕl', mŏs'kə-tĕl') *n.* A plant, *Adoxa moschatellina,* of northern regions, having greenish-white, musk-scented flowers. [French *moscatelle,* from Italian *moscatella,* from *moscato,* musk, from Late Latin *muscus,* MUSK.]

Mos·cow (mŏs'kou', -kō). *Russian* **Mos·kva** (mŏsk-vä'). The capital and largest city of the Soviet Union, in the western Russian S.F.S.R., of which it is also the capital. Population, 6,942,000.

Moscow River (mŏs'kou', -kō). A river rising in the eastern Smolensk-Moscow Upland, and flowing generally east 315 miles to join the Oka River near Kolomna.

Mose·ley (mōz'lē), **Henry Gwyn-Jeffreys.** 1887–1915. British physicist; developed modern form of the periodic table.

Mo·selle¹ (mō-zĕl'). *German* **Mo·sel** (mō'zəl). A river rising in northeastern France and flowing 320 miles to join the Rhine.

Mo·selle² (mō-zĕl') *n.* A light, dry white wine produced in the valley of the Moselle River.

Mo·ses¹ (mō'zĭz, -zĭs). A masculine given name. [Middle English *Moyse,* after MOSES.]

Mo·ses² (mō'zĭz, -zĭs). The lawgiver who led the Israelites out of Egypt. [Latin and Greek *Mōsēs,* from Hebrew *Mosheh,* possibly from Egyptian *mes,* child.]

mo·sey (mō'zē) *intr.v.* **-seyed, -seying, -seys.** *Informal.* **1.** To jog along. **2.** To get going; move along. [Origin obscure.]

Mos·lem (mŏz'ləm, mŏs'-) *n.* Also **Mus·lim, Mus·lem** (mŭz'ləm, mo͝oz'-, mŭs'-, mo͝os'-), *archaic* **Mus·sul·man** (mŭs'əl-mən, mo͝os'-). A believer in or adherent of Islam. [Arabic *muslim,* MUSLIM.] —**Mos'lem** *adj.*

Usage: Moslem is the form predominantly preferred in journalism and popular usage. *Muslim* is preferred by scholars and by English-speaking adherents of Islam; it is considered the only correct form by members of the **Nation of Islam** *(see).*

Moslem calendar. The lunar calendar used in Moslem countries. See **calendar.**

mosque (mŏsk) *n.* A Moslem house of worship. Also called "masjid," "musjid." [French *mosquée,* from Italian *moschea,* from Arabic *masjid,* a place of worship, from *sajada,* to worship.]

mos·qui·to (mə-skē'tō) *n., pl.* **-toes** or **-tos.** Any of various winged insects of the family Culicidae, in which the female of most species is distinguished by a long proboscis for sucking blood. Some species are vectors of diseases such as malaria and yellow fever. [Spanish, from *mosca,* fly, from Latin *musca.* See **mū-²** in Appendix.*]

Mos·qui·to (mō-skē'tō) *n., pl.* **Mosquito** or **-tos. 1.** A South American Indian people living on the Atlantic coast of Nicaragua and Honduras. **2.** The languages of this people.

mosquito boat. *Chiefly British.* A **PT boat** *(see).*

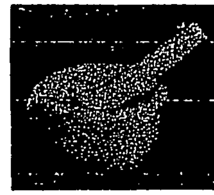
mosquito hawk. 1. A bird, the **nighthawk** *(see).* **2.** An insect, the **dragonfly** *(see).*

mosquito net. A fine net used to cover windows and beds to keep out mosquitoes.

moss (môs, mŏs) *n.* **1.** Any of various green, usually small plants of the class Musci within the division Bryophyta. **2.** A patch or covering of such plants. **3.** Any of various other plants that are similar in appearance or manner of growth, such as **club moss, Irish moss,** and **Spanish moss** *(all of which see).* **4.** *Chiefly Scottish.* A peat bog or moor. [Middle English *moss, mos,* Old English *mos.* See **meu-** in Appendix.*]

moss·back (môs'băk', mŏs'-) *n.* **1.** An old shellfish or turtle with a growth of algae on its back. **2.** *Slang.* An extremely conservative or old-fashioned person. —**moss'backed'** *adj.*

Möss·bau·er (mœs'bou'ər, mŏs'-), **Rudolf Ludwig.** Born



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Porcelain mortar and pestle

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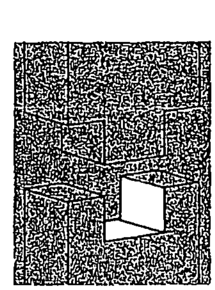

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PEP THE SOCIAL SCIENCE INSTITUTE

April 1975 Price £2·50

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Published by PEP, 12 Upper Belgrave Street, London SW1X 8BB
Printed by George Berridge & Co. Ltd., London & Thetford

FOREWORD AND ACKNOWLEDGEMENTS

This publication is one of a series to come from PEP's study of inflation which is being undertaken with a grant from the Leverhulme Trust.

One of the authors of this broadsheet has been a member of the OECD's team of examiners appointed to conduct a review of Finland's manpower policies. In that context as well as more directly in relation to the preparation of this broadsheet many public servants, industrialists and trade union representatives have given information and comment with quite remarkable generosity. To all of them the authors are deeply indebted. A very special acknowledgement is due to Pauli Snellman, the International Secretary at the Ministry of Labour in Helsinki, who took great pains over arranging interviews for the second author with some extremely busy and knowledgeable people.

Helena Sledziewska typed and retyped drafts of this material and has helped with checking proofs.

PEP and the authors of this broadsheet are grateful to all these organisations and people for their help.

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VI Finnish bank deposit accounts

The division of the Finnish banking system into commercial savings, co-operative and Post Office groups was described in Chapter IV. With an undeveloped stock market, a deposit account at one of these banks is often the only place a Finn can find to put his savings. Terms governing bank deposits are therefore an important influence on the savings of the household sector.

Five-year gestation

As the rapid inflation of 1950–1 was being checked by the stabilisation programme begun in October 1951, the banks took the decision, in principle, to adjust both their loans and deposits for inflation, on the basis of quarterly inspections of the cost-of-living index. The principle was examined by the joint body of Finnish financial institutions in 1950 at the initiative of the chairman (Rainer von Fieandt)* of the board of the large commercial bank Oy Pohjoismaiden Yhdyspankki (Ab Nordiska Föreningsbanken).

The banks claimed to be motivated by two desires: to promote economic justice and to protect the growth of their deposits. The new system was to come into being at the beginning of 1952, and a working party was set up by the joint standing committee of Finnish financial institutions to study the practical details. Finnish bankers are as cautious as any, and index-linked accounts were not launched until 3½ years later.

The initial idea had been to apply an extra charge to all loans equal to half the rise in the index, and then to use the funds to compensate all depositors for half their loss due to inflation. What was eventually decided was different and more complex. Not all deposits were index-linked, but only specifically designated accounts carrying certain restrictions on withdrawal. Full inflation proofing was given to these designated accounts. The money needed to make them keep pace with the cost of living was found by imposing an 'index surcharge' on *all* loans. The amount of the surcharge was usually fixed according to the proportion of the bank's deposits benefiting by index adjustment, so that the bank could just balance its

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*Mr von Fieandt later became Governor of the Bank of Finland, and was Prime Minister for five months in 1957–8. After this he represented Finland at the IMF and the IBRD.

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commitments. (See Chapter IX.) This was of course less disadvantageous to borrowers than the initially envisaged scheme, so long as not more than half the funds on deposit were index-linked. In fact, it was only during a short-lived peak of popularity, in 1968, that index-linked accounts came anywhere near to half of all deposits. Until then a quarter had been the maximum. When these figures are considered it should be borne in mind that only a fraction of total deposits are genuine savings. One expert estimate is that 75–80 per cent of money banked is effectively on current account.

Birth and infancy

The first index-linked bank account was opened on 2 May 1955. This was a time when retail prices had been very steady for several years. While the authorities knew that this stability was fragile and that inflation could break loose again at any time, to the general public there can have seemed little point in the new arrangement offered by the banks.

The accounts were in four respects less favourable than ordinary deposit accounts. A lump sum of 30,000 markka (about 1972 £80) was required to open an index-linked account: such an initial deposit was not required for an ordinary account. Secondly, no withdrawals could be made for a full year from an index-linked account, whereas an ordinary deposit account could be closed within six months and 100,000 markka might be drawn from it each month. Thirdly, the interest on index-linked deposits was 1–1½ percentage points below that for normal deposits. Lastly, index-linked deposits did not share the privilege of tax exemption that ordinary savings enjoyed.

The mechanism of index compensation worked in the following way. Once the cost-of-living index (October 1951 = 100) had risen 2 points above 104, the capital was increased by as many full 2 per cents as the index had risen between deposit and withdrawal. The figures used were the averages (to the nearest whole number) of the index values for the three months before deposit and withdrawal respectively. The system did not work the other way: no reduction would take place if the index fell.

From May to the end of 1955 the facility remained available but practically unused. The first step of indexed compensation was only to be taken when the cost-of-living index reached 106. Throughout 1955 the index stayed safely in the neighbourhood of 100 (in fact, it was below 100 until August). During the first five months of their existence about 260 million markka (about 1972 £700,000) were placed in indexed accounts. While this was happening ordinary savings accounts grew by 8,700 million markka to 295,000 million markka—more than a thousand times the total of index-linked deposits. On 1 July 1955 index-linked accounts were made comparatively even less attractive by a ½ point rise in the interest rate on non-indexed deposits.

Index-tied accounts had been introduced simultaneously in all credit institutions except for one large savings bank, Helsingin Työväen Säästöpankki (now Suomen Työväen Säästöpankki). At first the commercial banks captured most of the funds on index-tied accounts, as was only natural in

view of their dominance of the money market. But in December 1955 all commercial banks (but not the savings banks or cooperative societies) throughout Finland, and all types of bank in Greater Helsinki, stopped accepting new deposits on index-tied accounts. As the accounts opened earlier in commercial banks came of age and were closed down, the savings banks came to hold more than half of all index-tied deposits, even though they had only about 40 per cent of total deposits. The cooperative credit societies at this time had 40 per cent of index-tied funds, though a mere 20 per cent of total deposits.

At the beginning of 1956 a sudden burst of inflation caused index compensation to be paid out for the first time—the actual payments were made in June. During 1956, index-tied deposits received the same regular interest as did ordinary deposits. Depositors now started to show more interest in indexed accounts. The sum deposited grew steadily throughout 1956, and the commercial banks had second thoughts about rejecting this line of business. In January 1957 they offered indexed accounts again, and rapidly regained 30 per cent of the market. By then index-tied deposits were increasing at such a rate that, despite the commercial banks' incursion, the index-tied totals at the savings and cooperative banks continued to grow. By contrast the total of all bank deposits was at the time decreasing.

In January 1957 a choice of two kinds of index-tied account became available to the public. In addition to the old conditions of 100 per cent index compensation on a taxable (now called 'A') account, 'B' accounts were offered. These were tax free (like non-indexed deposit accounts) but gave only 50 per cent index compensation. 'B' accounts achieved instant popularity, and within a year of their introduction accounted for 44 per cent of all index-tied deposits. They were given a further boost early in 1958 when the banks gave customers the opportunity to avoid a proposed advance collection of income tax on 'A' index premia by switching their money from 'A' to 'B' accounts. In April 1958, 72 per cent of all index-tied deposits were held in the 'B' accounts.

September 1958 marked the peak of the first phase of popularity for index-tied bank accounts. They had passed one quarter of all deposits. By this time the bout of inflation that had made them attractive was over. A decline of the index-tied total set in. In January 1959, 'A' accounts were discontinued, and for the next five years practically all index-tied accounts were of the 'B' type, tax free but with only 50 per cent protection against inflation.

Rivals

Expansion of index-linked deposit accounts as a method of saving was much affected by competition from various alternatives at different times. Initially their growth was impeded by a strong sale of government bonds. The 5 per cent bond loan for public subscription of May 1955 promised full index compensation on the same terms as the indexed bank accounts that were introduced that month. The deposits received interest at 4¾ per cent. While ¼ per cent less interest might have appeared a fair price to pay for the

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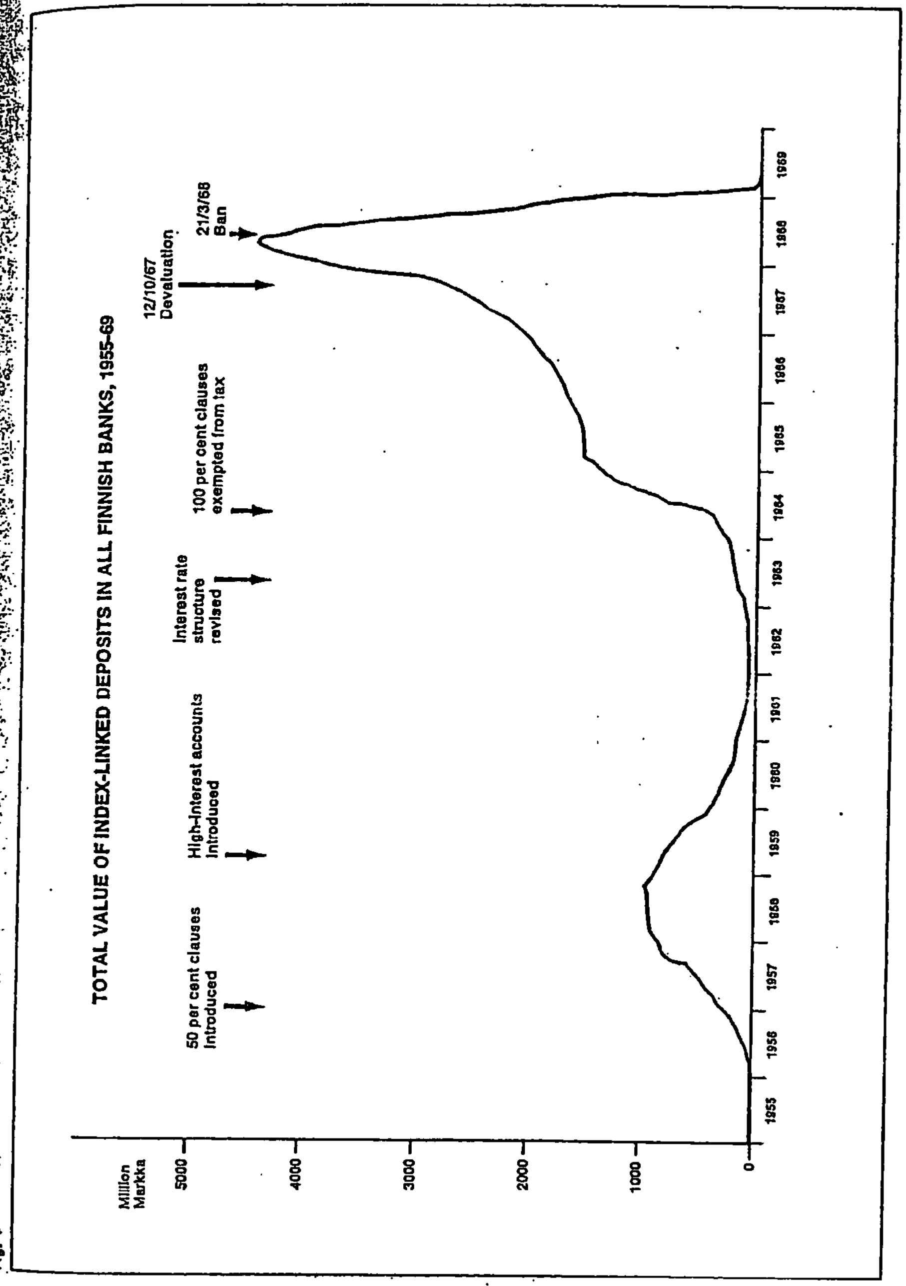

Fig. 4 TOTAL VALUE OF INDEX-LINKED DEPOSITS IN ALL FINNISH BANKS, 1955-69

greater liquidity of the bank deposits (a one-year rather than five-year maturity), against that the return on the government bonds was tax free. Ordinary savings at banks were exempt from tax on the grounds that the government wished to make up to the saver his loss through inflation. Logic required that interest on index-linked deposits, already inflation-proofed, should be liable for tax like any other income.

It did not escape the banks that this line of logic implied that the return on indexed government bonds should also be taxed. Discussions between the financial institutions and the government brought about agreement (at the end of 1956) on some changes. The interest margin between bank deposits and bonds was narrowed by half a percentage point. More significantly, deposits and government bonds were both to be subject to the same tax treatment. Returns on indexed assets were to be exempt from tax so long as the degree of linkage to the index was not greater than 50 per cent.

It is useful to consider the reasoning underlying the widespread use of a 50 per cent index clause by the Finns. At first glance it appears a half-hearted way to protect people from inflation. It is tempting to think that if there is to be an index clause at all it might as well do the job properly. Cynics have explained 50 per cent protection as the average of the rates put forward by keen advocates and outright opponents of indexing. Certainly it is in large part a product of compromise. But there is some economic justification. In the first place, it cuts down to a negligible size the risk of accelerating the inflationary spiral (see Appendix A). Secondly, it reduces fluctuations in the rate of return. The holder of a 50 per cent indexed asset has the equivalent of a ready-made investment portfolio, half in fixed-interest deposits and half fully indexed.

To take advantage of the parity of tax treatment agreed with the government at the end of 1956, the banks introduced a new type of indexed account. 'B' accounts had 50 per cent index clauses and, in accordance with the latest ruling, were tax free. But for protests from the savings banks, the commercial banks would have let these accounts take over entirely, cancelling the former 100 per cent inflation proofed but taxed type. The savings banks, however, insisted on keeping full protection for the small saver, who fared better under the old arrangement because of his low marginal tax rate. (The two types of indexed account in fact were available at the same time for a total of only five years out of the thirteen for which one or other existed.) Government bonds from this time on used index clauses only of the 50 per cent variety.

'A' and 'B' accounts at first carried the same basic rate of interest, 4½ per cent. In January 1957, when 'B' accounts started, the index clause for 'A' accounts was made more sensitive. Compensation was now to be paid for full 1 per cent changes in the cost-of-living index, instead of full 2 per cents. 'B' accounts received exactly half the index-related compensation rate paid on 'A' accounts. It was at this time that the commercial banks and institutions in Helsinki which had stopped accepting indexed deposits a year earlier came back into this business again.

Early in 1957 Finnish bank deposits received the highest gross nominal

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returns ever given up to that time. For two months, 'A' accounts received interest (that is, basic interest plus index-based payment) of $18\frac{3}{4}$ per cent. A year later they were still getting $12\frac{3}{4}$ per cent, and 'B' accounts were receiving $8\frac{3}{4}$ per cent, tax free.

Late in 1958 the pace of inflation slackened, and index-tied deposits began to fall off. From 1 January 1959 deposits were no longer accepted on 'A' accounts, which by this time had fallen to under a quarter of all indexed deposits. In the spring and early summer of 1959 the banks offered two new alternatives to indexed accounts. 'High-interest' accounts offered a steady 5 per cent (to be compared with the $3\frac{1}{2}$ per cent current basic rate on indexed accounts). The period of deposit was 12 months, the same as for indexed accounts. The second kind, 'tax-concession' accounts, gave immunity from taxation to funds held in them for at least three years, with a maximum on the tax saving of 80,000 markka (about 1972 £150).

Tax-concession accounts presented no real threat to index-linked accounts. They collected no more than 150 million Markka (perhaps 2 per cent of total deposits) and died out altogether at the end of 1963. High-interest accounts, on the other hand, grew rapidly at the expense of index-linked deposits. Index linkage was of little value to depositors from 1959 to 1962. For most of this period price changes were small enough to hold index premia to 1 per cent or less, keeping the yield on 'B' accounts, at $3\frac{1}{2}$–$4\frac{1}{2}$ per cent, well below what was available on high-interest accounts. The latter consistently held a good 10 per cent of all deposits. A modified form of these high-interest accounts was the natural choice of most depositors in index-linked accounts when those were abolished in 1968.

Earlier, index-linked accounts won against another potential rival. The stock exchange suffered a severe decline in 1956 because of the advent of a new type of real-value asset.

Rise to fame

On 1 June 1963 a new interest rate agreement came into force. Its purpose was to further differentiate the interest rate structure on various types of deposits without altering the overall average rate. Among its provisions was an increase in the interest rate on high-interest accounts from 5 to 6 per cent. The rate on 50 per cent index-tied deposits was lowered from 4 to $3\frac{1}{2}$ per cent. 100 per cent index-tied accounts, unavailable since 31 December 1958, were offered again, at 3 per cent interest; these remained subject to taxation.

At the beginning of 1963 index-tied deposits had already started to revive. In May 1964 they reached about six times the level at which they had stagnated in 1961–2. Then in a single month they leapt up by more than half. The reason for this was a piece of legislation which was later to be called 'the fatal flaw' in the Finnish system of index clauses. It freed all index-tied deposits from taxation. Holders of high-interest accounts and old-style indexed accounts of either 'A' or 'B' type were permitted to transfer their savings to new-style tax free 100 per cent indexed 'A' accounts. They did so rapidly, in large numbers.

This marked the beginning of a dramatic rise in the sum deposited on indexed accounts. Their total increased tenfold in four years; an average annual growth rate of 78 per cent. To some extent this can be explained in terms of the increasing rate of inflation, and people's growing awareness of their need of protection. The rate of increase of deposits certainly slackened in 1965–6 when inflation was less severe. But a fundamental change in the structure of the money market was in progress. Earlier there had been substantial tax concessions to encourage the building of private houses. These were being phased out, and capital that might have gone into new housing found its way instead into index-linked deposit accounts. Their new tax status had made them the most attractive financial asset in Finland.

'B' accounts suffered a death blow when 'A' accounts were freed from tax. The 1-1½ points extra interest which they offered enabled them to survive for another three years, but they tapered off completely at the end of that period.

The devaluation of October 1967 brought about the final explosion in index-linked deposits. Correctly expecting a sharp price rise, depositors shifted nearly all their long-term savings into index-linked accounts. 1,500 million Markka (about 1972 £200 million) flowed into these accounts in the space of six months.

Sudden death

In March 1968 a stabilisation agreement was signed by the central trade union and employer organisations. (See Appendix D.) Designed to quell the post-devaluation price surge, this traded wage restraint for price control. Among its provisions was the abolition of the system of index linkages for wages, rents, business contracts, bonds and bank deposits. The index clause was not to be applied to bank deposits after 30 November 1968.

Even more suddenly than they had sprung to prominence, index-tied deposits fell. A year later, all the money formerly in indexed accounts had left them. Most of it went straight to one of the high-interest accounts. New six and twenty-four month accounts offering 4½ per cent and 6 per cent interest respectively were available from 1 March 1969, as well as the old twelve month accounts which now gave 5 per cent. One outcome of the life and death of indexed bank deposits was that the share of long-term (at least one year) deposits in total deposits was much increased. Before the index-linked boom, at the end of 1963, this share had been 13 per cent: in February 1969 it reached 34 per cent.

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VII Bonds issued by Finnish government or industry

Background of indexation of bonds

For background to the substantial government index bond issues of the middle fifties one needs to go back to 1945. In that year indemnity bonds were given by the government to Karelians who migrated from the rather more than one-tenth of Finnish territory which had to be ceded to the Soviet Union.

Wherever possible, the Karelians' losses were made good in kind: farmers were given land, fishermen lakeside sites and house-owners building plots. Where individuals had lost stock and shares they were given similar holdings in large companies or state undertakings. Most small claims were settled in cash. Only when these ways of providing compensation were exhausted did the government resort to promissory notes or bonds; nevertheless a large part of compensation under the Second Indemnification Act had to be in this form.

During 1945–7 the average annual rise in Finland's cost-of-living index was over 43 per cent. In that context it was reasonable that bonds intended to compensate evacuees for their lost property should be inflation proofed. The method chosen was to increase the principal by 10 per cent for every 10 per cent rise in the domestic wholesale price index. During the ten-year repayment period, this index quadrupled; in consequence, some 61 thousand million markka were paid out in index-based compensation, on a debt whose nominal value was originally a mere 18 thousand million markka (about 1972 £12m.). Interest was paid at 4 per cent per annum on the current nominal value; thus, for every £10 of debt in 1944, by 1955 £29 capital and £5 interest had been handed over because of the index clause, as well as the original £10 and its £2 interest—in all £46.

Government bonds

In the late 1950s the Finnish government sold bonds of the order of 100 million markka (1972 £20m.) a year to the private sector; during the 1960s bond issues were higher, reaching a peak of over 600 million Markka in 1965 and 1966. Most issues were made for buyers such as insurance companies or banks and designed to suit their needs. Others were available for public subscription and thus stood in direct competition with bank deposit

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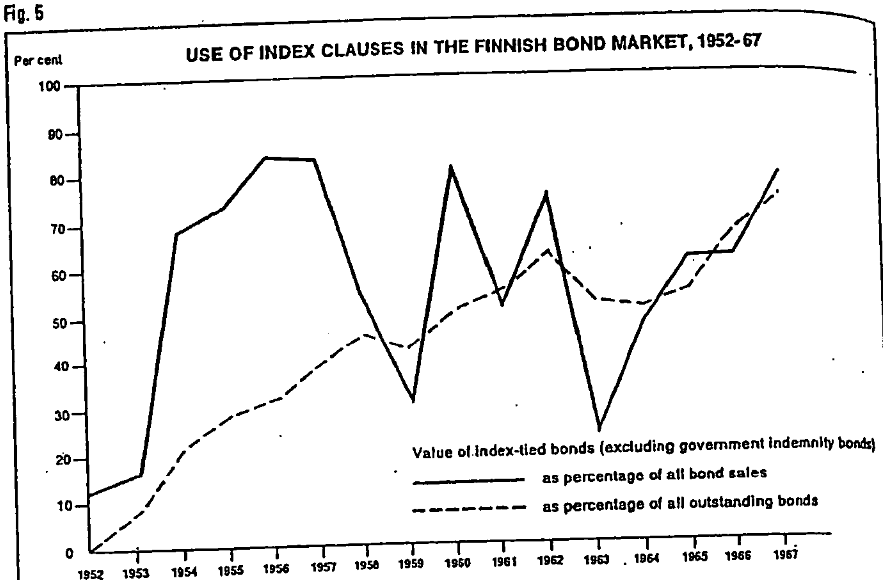
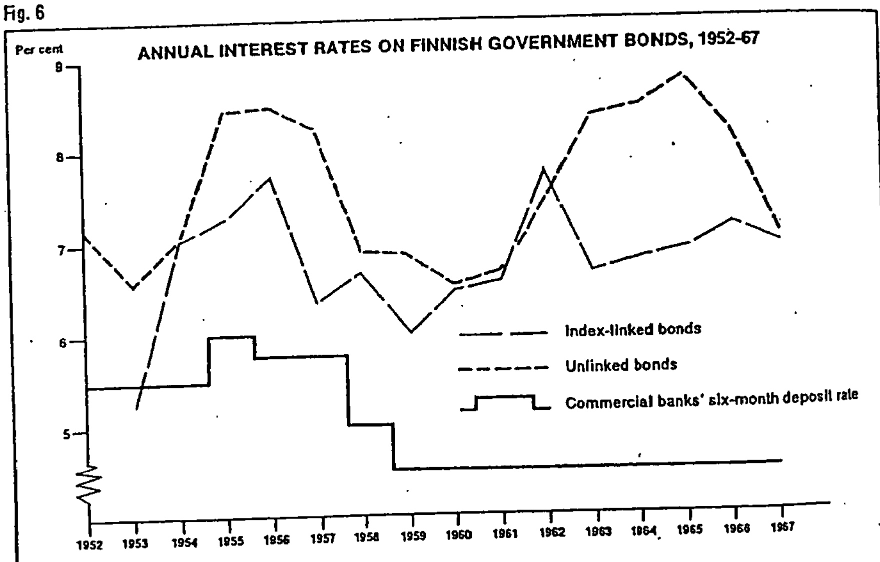
Fig. 5



Source: Kari Puumanen: 'The index clauses in financial markets: the Finnish system in retrospect', Kansallis-Osake-Pankki Economic Review 1973, No 3.

Fig. 6



Source: 'The index clause system in the Finnish money and capital markets', Bank of Finland Institute for Economic Research, January 1969; table 7.

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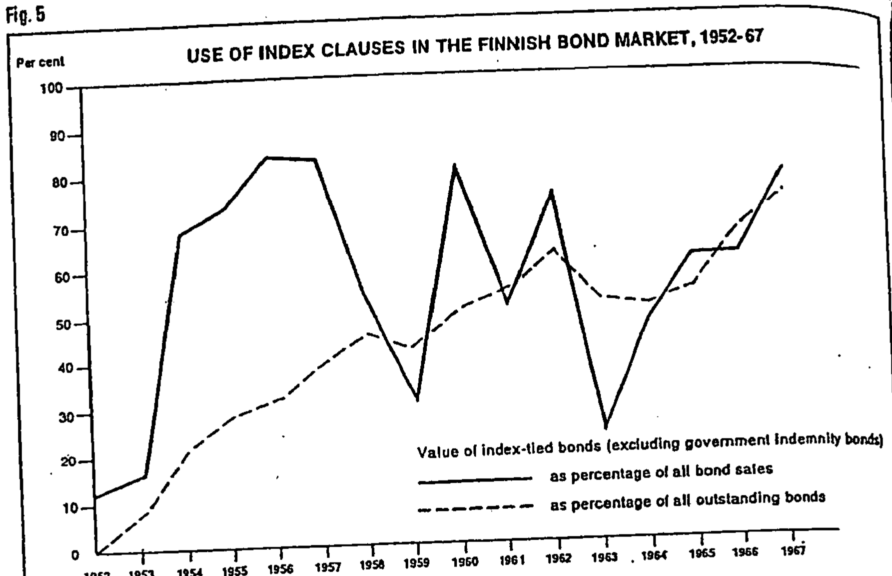

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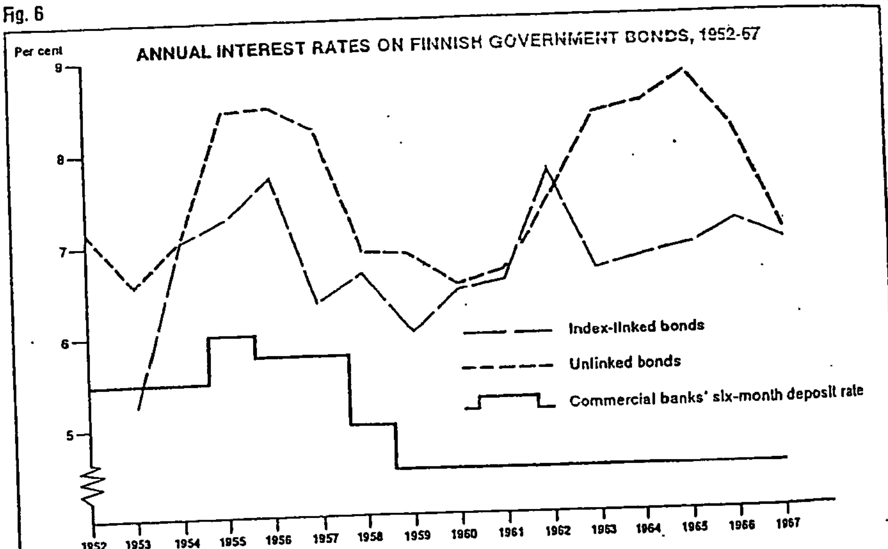

Source: 'The index clause system in the Finnish money and capital markets', Bank of Finland Institute for Economic Research, January 1969; table 7.

HE FINNISH BOND MARKET, 1952-67

of index-tied bonds (excluding government indemnity bonds)
as percentage of all bond sales
as percentage of all outstanding bonds

60 1961 1962 1963 1964 1965 1966 1967

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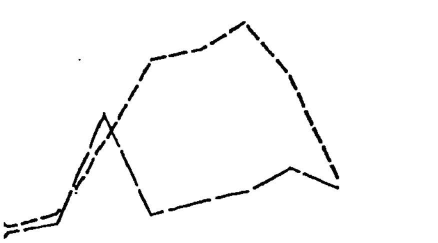
NISH GOVERNMENT BONDS, 1952-67



Index-linked bonds
Unlinked bonds
Commercial banks' six-month deposit rate

960 1961 1962 1963 1964 1965 1966 1967

nd capital markets',
/ 1969; table 7.

accounts, the main repository of the Finns' relatively high level of personal savings. Local authorities and firms have also issued bonds, but central government bonds have dominated the long-term capital market throughout the period, and what government has done about index-linking of issues swamps the effect of similar moves by the others.

Institutional buyers had need of index-linked securities to enable them to meet their own index-linked obligations to the public. The demand from insurance companies, which had been operating index-linked policy schemes ever since 1948, was particularly steady. Banks and cooperative credit societies needed the income from index bonds to help pay compensation on indexed deposit accounts. Pension funds similarly had somehow to finance statutorily index-linked outgoings. The fact that the secondary market in bonds in Finland is very small, original buyers usually holding their bonds for ten or more years to maturity, increased the importance of including a value guarantee in these contracts.

In the month of September in 1953, 1954 and 1955, as the final payments on the index-tied second indemnity loan became due, new index-tied bond issues were made for its conversion. Each was paid off over a period of five years, and carried interest at 5 or 5½ per cent per annum. They were linked to the wholesale price index for Finnish goods, their value changing by as many full 5 per cents (up or down) as the index might have moved by the date of amortisation. The government safeguarded itself, however, against incurring a vast liability in the event of runaway inflation by making the index clause invalid once the index had doubled its starting value.

Between 1953 and 1968 the government made, on average, four or five major bond issues each year with an index clause. Throughout the period, sales of these bonds were a substantial proportion of total bond sales, though their market share fluctuated. It shot up from under 20 per cent in 1953 to over 80 per cent in 1956 and 1957. There was a drop to under 30 per cent in 1959, and a fresh peak of 80 per cent in 1960. A subsequent decline to just over 20 per cent in 1963 was followed by a rise again to 80 per cent in 1968, when all forms of indexation were abolished. The share of all outstanding bond loans carrying index clauses rose steadily over the period to reach more than three quarters.

Techniques of index linking

However, the 5 per cent bond of May 1955, issued for public subscription, was the only government bond (other than those associated with the Karelian indemnity issues) to carry a full index clause, in the sense that rises in the index were to cause matched rises (per cent for per cent) in amortisation and interest payments. Recognition of the risk in promising full compensation led to the writing in of an upper limit of a 100 per cent rise in the index, as in the Karelian indemnity conversion loans. A threshold was built into the 1955 bond's index clause, and a delayed first step over the threshold: index-based premia were not incurred while the index was rising from 100 to 104, and then the first premium was not to be paid until 106 was reached, though later premia became due point by point. Repayment was to be by

five annual instalments, each of equal starting nominal value, and, because of the index link, of equal final real value. The index in question was the cost-of-living index. This was used in all major government index bond issues, with the single exception of the ten-year bonds sold to the National Pensions Institute in April 1963, which had a tie to the wholesale price index for Finnish goods. After the full index link of 1955, this form of inflation-proofing was abandoned in favour of one less attractive to the buyer but safer for the seller. The '50 per cent index clause' meant that a rise of 2 per cent in the index brought only a 1 per cent rise in amortisation and interest payments.

In addition to this return related to the cost-of-living index, ordinary interest was paid on these loans. In many cases the interest rate was fixed for the duration of the loan, a figure between 5 and 8 per cent per annum nearly always being chosen. Also popular with subscribers was a 'variable' interest rate, specified as a given number of percentage points (in practice, 1–3 points) above the current rate of interest offered on six-month deposits at the two largest commercial banks. One large five-year issue, made in four instalments in 1957 for the benefit of private credit institutions, earned interest at half a percentage point more than the current rate on index-linked bank deposits, indicating the sharpness at that time of competition for funds between government and the banks.

The importance of index linking in Finnish government bond issues in 1967–8 is shown by the eleven issues of winter 1967–8. Seven of these, together accounting for half of the total nominal value, carried index clauses. All of that indexation was of the 50 per cent cost-of-living type. The index-linked bonds were of ten, sixteen, or twenty-five year maturity. Non-indexed bonds had much shorter maturities—two or five years. Interest rates ranged from 6½ to 7½ per cent per annum for indexed bonds, and were 8 to 8¾ per cent for those without an index clause. Of five issues for subscription by banking institutions three had an index clause; the one issue for insurance companies was indexed. Of the other five (for public subscription) two were index-linked.

Earlier indexed issues of significance included a series of Forest Improvement Loans, whose proceeds were re-lent to forest owners for projects aimed at increasing wood production; this necessarily long-term enterprise was a natural candidate for inflation-proofing. The Labour Pension Funds for farming, lumbering and construction were also large buyers of indexed bonds. The list is completed by the various indexed issues intended for redemption of Tax Payment Certificates; these amounted to very large sums, and are a good illustration of the scope for integrity on the part of government in arranging its finances.

Assessment of benefits to investors

The Bank of Finland Institute for Economic Research has published weighted average annual interest rates on government bond issues with and without index ties, for each year from 1953 to 1967. For the whole of this period the yield spread between indexed and non-indexed bonds in the

Bank of Finland's table was much smaller than half the annual percentage change in the cost-of-living index. This means that those who were able to buy index-linked bonds did significantly better than those who did not. In part index-linked bondholders paid for this comparatively high return with the longer maturity of their bonds. But probably their gain must be explained mainly in terms of the Bank of Finland's conservative money market management policy.

Mortgage bank bonds

Next in importance to the government in the bond market come the mortgage banks. But their combined activity has on average amounted to no more than about a fifth of government bond issues. Finnish mortgage bank loans are confined to industrial and agricultural property; private house purchase is largely financed by government loans. Three institutions did most selling of bonds with index clauses: the Industrial Mortgage Bank of Finland (Suomen Teollisuus-Hypoteekkipankki Oy, STHPO); the Real Estate Bank of Finland (Suomen Kiinteistöpankki Oy, SKPO); and the Land and Industrial Real Estate Bank (Maa-ja Teollisuuskiinteistöpankki Oy, MTKPO). Each is wholly owned by one of the three non-governmental banking groups—STHPO by the commercial banks, SKPO by the savings banks and MTKPO by the cooperative credit societies.

The most striking difference in the terms of issue between these bonds and government bonds is the variety of indices which they used. While nearly all of the government issues were tied to the cost-of-living index, the mortgage banks linked their issues not only to that index but used the wholesale price index or its domestic subindex, or the export price index, or the official exchange rate for sterling as alternatives. All links were limited to half the change in the index. To compete with government bonds these issues had to offer comparatively high rates of interest, since the former had the privilege of exemption from tax. Repayment arrangements were similar to those for government bonds.

Industrial bonds

In each year between 1957 and 1967, private industrial concerns raised between three and thirty million Markka by means of index-linked bonds. From 1962 on, however, unlinked bonds became more prominent, and index-linking was not of such widespread importance in this sphere as it was in the world of mortgage and other finance. Industrial bonds tended to mature rather slowly, but also to have some added attraction, such as twice yearly payment of interest. Where a link was included it was more often with the wholesale price index than with the cost-of-living index. The indexation element was never so strong as to transmit half the change in the index; frequently a mere quarter was allowed.

Leading industrial index-bondmakers were in the wood manufacturing industry, engineering works and shipyards (Rauma-Repola Oy) and the Cooperative Wholesale Society. Others who joined in the process were the

Finnish Steamship Company, the Northern Power Company, a firm in sulphate, pulp and paper milling (Lohja-Kotka Oy), a manufacturer of oil products (Neste Oy) and the Central Organisation of Agricultural Cooperative Societies.

Local authority bonds

Though local authority bond issue has been small in volume, it deserves mention for two reasons. The City of Helsinki pioneered the way for index clauses in bonds with its 50 per cent cost-of-living link in 1952—a year before the first government index bond, and five years before non-financial companies were first authorised to issue index-tied bonds. In keeping with that pioneering past, practically all local authority bonds brought out in the subsequent fifteen years carried a similar clause. Besides Helsinki, the towns of Tampere, Porvoo, Turku, Loviisa and Vaasa all borrowed in this way at one time or another.

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VIII Social security, pensions and insurance in Finland

There is a long established Finnish tradition of maintaining the value of social security benefits and pensions, both in relation to earned incomes and against rising prices. A similar approach has also been taken towards protecting the worth of insurance policies. The method generally adopted for this purpose has been a link between these payments and an index of price changes. This arrangement for social security and pension benefits was thought to be so important that it was exempted from the scope of the 1968 legislation which prohibited most forms of index linking.

Social security benefits

Finland's old age, disability and widows' pensions are tied to the cost of living both in relation to the region where the person lives and in terms of the year to year changes in prices. The country is divided into three 'cost-of-living areas'. State pensions have tended to be about 18 per cent above those for the cheapest area in the intermediate cost-of-living zone, and about 35 per cent higher for the area with the highest rating on the index. The amount paid to the pensioner rises to provide full compensation as soon as the national cost-of-living index has risen by 3 per cent since the previous adjustment. This system has been in operation since 1957. Unemployment benefits and family allowances are also related to the local cost of living.

Other social benefits, for example income maintenance during sickness, have not had direct links with price indices. But being more closely and automatically related to earnings (sickness benefit is granted at a daily rate of 1/450 of the previous year's earnings), they have provided the recipient with greater protection against price increases than is available to his counterpart in Britain.

Occupational pensions

In addition to the basic state pension, all employees receive an occupational pension from their ex-employer. The 1962 legislation on occupational pensions requires them to be adjusted annually on the basis of the Ministry for Social Affairs' general *earnings* index. Self-employed people are covered by a compulsory old-age insurance scheme. Benefits from this scheme too

are adjusted in step with the general *earnings* index.

The fact that many occupational pensions are based on earnings late in life has meant very large increases for some pensioners. In early 1974 discussions were going on to establish whether these groups were being compensated too generously. An alternative solution being canvassed was a link with the index of *rates* of wages rather than the actual earnings index.

Life and accident insurance

Insurance companies in Finland were among the first to see the need for index-linking and to take practical steps in that direction. As early as 1948 they were issuing both risk and endowment policies with cost-of-living clauses. And they still continue to do so. Index-linking is not automatic but offered as an option with all policies. Not surprisingly, it has been taken up by the vast majority of applicants; in 1965 index-linked policies accounted for 99 per cent of all new insurance business.

A straight risk policy can be index-linked simply by index-linking the premia to be paid by the insured. Endowment policies are more complicated to index-link: the insurance company needs to find index-linked investments, in addition to asking the policy holder for an indexed premium. The insurance companies in Finland used much of their income to extend index-linked loans. Generally, a 50 per cent clause was applied for both the loans and insurance cover for the policy holder. Insurance companies were also natural subscribers to government index-linked bonds.

An example of an index clause of a type commonly used in insurance policies is shown on page 65. It stipulates 100 per cent linkage for the first three years (a period during which an individual policy's contribution to the firm's funds is quite small) and 50 per cent linkage thereafter. A contingency clause protects the insurance company against failure to make index-based adjustments. If, for instance, the insurance company is unable to make enough index-linked investments, the index clause in the policy is open to cancellation for the following years (in its application both to premia and to cover). With appropriate foresight, the index clause offered by insurance companies covered the issue of possible legislation to prevent index-linking of policies. In that event, all parties would under the terms of the clause be obliged to accept the rulings of the Ministry for Social Affairs on how to deal with the situation.

The Economic Special Powers Act of 1968 brought about precisely these difficulties. While insurance business was specifically exempted from the general ban on index-linking this was of limited help, for the index-linked investments which had made this kind of business possible were abolished. For a time the companies went on getting index-linked income from existing government bonds and these funds were credited to index-linked policies. By abolishing with profits policies and channelling all surplus funds to keeping up with inflation, the companies have managed to maintain some degree of index-linking.

One exception to the all-pervasive indexation until 1968 was the state

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The index clause in Finnish life insurance

Full index clause

1 §. During the next three calendar years from the date of the policy the assurance cover (i.e. the sum assured and, if an additional insurance is attached to the policy the compensation consequently payable) and the premium are adjusted in conformity with the cost of living index in the following manner:

(a) The adjustment is effected once a year, at 0 hours on the day when the first premium of the calendar year falls due for payment (= the adjustment time).

(b) The basis of the adjustment is the October cost-of-living index (August 1938–July 1939 = 100). The October index of the calendar year immediately preceding the date of the policy is regarded as the basic index of the policy, and the October index of the calendar year immediately preceding the adjustment time is regarded as the index for adjustment.

(c) Both the assurance cover and the premium will be, starting from the adjustment time, as many per cent of their basic amounts (i.e. the amounts without the index clause) as the index for adjustment is of the basic index. The percentage thus obtained is, however, rounded off to the nearest smaller whole number but is taken to be 100 were it less than 100.

Half index clause

2 §. After three whole calendar years have elapsed from the date of the policy, when both the assurance cover and the premium were thus adjusted according to the third index for adjustment (= interim index) of the full index clause, the assurance cover and the premium are adjusted as prescribed under 1 § except that the index for adjustment will be taken as the average of the interim index and the October index of the calendar year immediately preceding the adjustment time. However, if the interim index is smaller than the basic index, the basic index and not the interim index will be used in calculating the average. Assurance cover and the premium are not reduced below the level that would be valid without the half index clause.

When the premiums are paid up, the adjustment time is 0 hours on January 1.

3 §. If the representatives of the policyholders find at a general meeting of the company that the company no longer holds index-tied loans or other comparable investment property on a scale sufficient for the half index clause in accordance with the principle of safeguarding the insured benefits under the Insurance Companies Act, the assurance cover and the premium will no longer during the following calendar years be increased according to the half index clause.

If because of legislation it proves necessary to abolish entirely or in part the index increases in the loans extended by the company, the question of whether and to what extent the increase in the assurance protection resulting from the half index clause is to be reduced in consequence will be worked out on the grounds laid down by the Ministry for Social Affairs. The index increases received by the company both from premiums and from index-tied loans must in this connection be credited to the policyholders.

Special stipulations

4 §. If the policyholder requests not later than a month prior to the adjustment time that the assurance protection and premium be no longer adjusted according to the index, the company will consent to it.

5 §. The methods employed in the application of the index clause will be approved by the Ministry for Social Affairs which will also settle any differences of opinion that may arise.

Source: Arvo Junnila: *Index Linkage of Life Assurance in Finland*, Helsinki, 1965.

insurance scheme against accidents at work. Instead of an index link providing automaticity, every two years a special Act of Parliament has been passed giving cost-of-living supplements to the previous levels of compensation. The scheme is employer financed, though state operated, and this unusual approach could owe something to the employers' organisations' wish to keep their contribution level and cost open to negotiation.

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IX Finland: loans with an index clause

The same methods of index linkage cannot always be applied to both saving and borrowing. Protection from inflation for savers is desirable on grounds of justice and in order to encourage investment. That outstanding debts should rise to match the reduction in the value of money may also be just, but such a system could powerfully discourage borrowing. Various ways have been tried in Finland to give savers maximum protection without imposing too heavy penalties on borrowers.

One way of going about getting some protection is the 50 per cent index clause, which the Finns have used extensively. Halving the extra amount that has to be paid out to creditors, because of the falling value of money, automatically halves the extra sums needing to be collected from the debtors. Another approach is to limit index linkage to a fraction—perhaps small—of the financial institutions' total liabilities. Indexed inflation proofing is clearly of the greatest importance for long-term transactions, and some long-term creditors will prefer fairly high fixed interest (rather than indexation) if offered the choice.

The National Pensions Institute of Finland started in 1946 to attach index clauses to some of the loans it made to businesses. They were linked to the domestic wholesale price index. Half of every loan was repayable in the ordinary way and the other half and interest and amortisation fully linked to the index. This, of course, is precisely equivalent to a 50 per cent index clause on the whole loan. In those early days there was an expectation that the price index could move downwards as well as up; consequently, adjustments of both capital and interest were permitted to occur in both directions. In actual fact, of course, there never was any downward adjustment. Though the Pensions Institute indexed only half of its lending operations it was able to pay fully indexed pensions, because the government made good the shortfall in its income.

Insurance companies also began, in 1948, to apply index linkage to their lending operations. Like the Pensions Institute, at first they too used a 50 per cent link with the domestic wholesale price index. Later the ordinary cost-of-living index became the more favoured link. Borrowers who ran into difficulties because of index generated rises in their obligations were allowed to extend their repayment period.

Banks started to make indexed charges on loans when their indexed

deposit business became of appreciable size. In the savings and cooperative bank sector this was in 1956. Similar charging arrangements by the commercial banks did not come into operation until rather more than a year after that. This part of the banking sector had interrupted this business for a year and initially were able to cover indexed payments to depositors with income from their holdings of government indexed bonds.

The Post Office Bank usually tied its loans 25 per cent to the cost-of-living index. All other banks operated on the principle of calculating an index surcharge on all loans at rates just sufficient to cover indexed payments to depositors. This meant, for example, that in a year when the index rose by 10 per cent, a bank with one fifth of its deposits in fully index-linked accounts would place an index surcharge of 2 per cent on all its outstanding loans. The surcharge became payable immediately by borrowers as additional interest; the outstanding debt was not, however, written up.

Bank pools

The proportion of index-linked deposits of course varied from bank to bank. To deal with that the cooperative banks established a pooling system to equalise the loan surcharges among themselves. The cooperative banks' central bank collected twice yearly from all members the proceeds of an index surcharge estimated so as to cover payments on indexed deposits in all cooperative banks taken together.

Initially, the savings banks had no comparable arrangement, each working out the necessary surcharge for itself. In some savings banks the proportion of indexed deposits was quite high, giving rise to a high index charge. In 1964 a pooling system similar to that of the cooperative banks was set up by the League of Finnish Savings Banks and their central bank. The operation began with three quarters of the savings banks as members of the pool. Between them they covered only 55 per cent of all savings bank lending: it was the larger banks in this group which chose not to join.

The other category of Finnish banks, the commercial banks, were all so large that their index surcharges worked out at the same level without any pooling arrangement. Each put its takings from index charges on borrowers in a special blocked account at the Bank of Finland. These balances yielded no interest and could only be used for making indexed payments to the commercial banks' depositors.

Government loans

Large-scale loans to industry were often tied 50 or 25 per cent to the wholesale price or cost-of-living index. In 1958–9 loans were granted to industry from the proceeds of the post-devaluation export levy. These were tied 33⅓ per cent to the exchange rate for sterling.

Loans from the state to individuals generally were not index-linked. Preeminent in this category were the very cheap loans available for housing. State loans to students to finance university level studies too carried a low rate of interest and no index charge, unlike their counterparts in Sweden.

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Reaction of borrowers

The systems of index-linking loans practised by the banks resulted in very moderate surcharges. Only in 1967, when index deposits rocketed, did they reach 2 per cent. A more typical value was ½–1 per cent. During 1959–63, years of low inflation and few indexed deposits, no index surcharges were levied at all.

Borrowers naturally preferred a known rate of interest to an indefinitely variable future liability. But though they might have been reluctant at first to accept index linkage of loans, no drop in lending was recorded as a result of the extent of indexation practised by the Finnish banks and the government.

X Finnish commercial and property contracts

The index linkages discussed so far are those established and operated by the state or large and well-known institutions in the private sector. At times of rapid price increases (and in the absence of price control) business and industry practise, as far as they can, a simple form of inflation-proofing: they raise prices to cover costs. This can be seen as inexplicit index-linking, the implicit index being the particular industry's labour and materials costs. Explicit, formal indexation is only necessary when a market price is not available, or where for some reason the market price is inappropriate. Retirement pensions provide one example, and some interest rates another. Price control by the government can push most product prices into this category by making some cost increases 'non-allowable', as in Britain during part of 1973–4. In that sort of situation producers may be able to benefit by raising prices with reference to a suitable index. Use of an index could also be the best way of preventing haggling about price revisions for long-term contracts.

Indexing in business

Nobody knows precisely the extent to which Finnish businessmen used index-linking in contracts among themselves. But it is certain that the practice was widespread. When a general index was used it was usually the wholesale price index. Particular industries often took the subindex relating to their own products or just the wage earnings part of that subindex.

International agreements were exempted from the 1968 ban in Finland on index-linking. The United Nations Economic Commission for Europe publishes general conditions for the supply of plant and machinery for export. The price revision clause of the set of conditions (formulated in 1955) is given on pp. 71–2. It is an excellent example of the flexibility which can be obtained through a simple indexation formula. First the contracting parties agree on a division of the price into proportions corresponding to materials, labour and fixed costs. They agree on suitable published indices for measuring the variations in the prices of materials and labour. The final price is then calculated from the original by raising the material and labour price components by as much as the indices have risen. This sort of procedure was a widespread feature of Finnish business transactions up to 1968.

al and property contracts

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Building contracts

Construction projects are particularly vulnerable to cost escalation during their often long lives. Builders cannot always sell at the tender price and stay solvent. Despite the 1968 prohibition, the most recent Finnish law on index-linking shows recognition of the special need for rules about price adjustment in this sector. It is now possible to link the selling price of buildings 66⅔ per cent to the materials and subcontracts subindex of the building cost index.

Before the 1968 prohibition, prices of buildings were commonly fully linked to the building cost index. This resulted in very healthy profits for builders, as they gained all the benefit from rising productivity—and those rises were rapid. The new arrangement reflects opinion about a more equitable distribution of cost increases between builder and buyer.

General conditions for the supply of plant and machinery for export

SUPPLEMENTARY CLAUSE

PRICE REVISION

Should any change occur in the cost of the relevant materials and/or wages during the period of execution of the contract, the agreed prices shall be subject to revision on the basis of the following formula:

$$P1 = \frac{P0}{100}\left(a + b\,\frac{M1}{M0} + c\,\frac{S1}{S0}\right)$$

where:

$P1$ = final price for invoicing

$P0$ = initial price of goods, as stipulated in the contract and as prevailing at the date of.. (1)

$M1$ = mean (2) of the prices (or price indices) for (type of materials concerned) .... over the period .... (3)

$M0$ = prices (or price indices) for the same materials at the date stipulated above for $P0$.

$S1$ = mean (2) of the wages (included social charges) or relevant indices (4) in respect of .... (specify categories of labour and social charges) over the period .... (3)

$S0$ = wages (including social charges) or relevant indices (4) in respect of the same categories at the date stipulated above for $P0$.

a, b, c, represent the contractually agreed percentage of the individual elements of the initial price, which add up to 100.

$(a + b + c = 100)$

a = fixed proportion = ...

b = percentage proportion of materials = ...

c = percentage proportion of wages (including social charges) = ...

Where necessary, b (and if need be, c) can be broken down into as many partial percentages ($b1$, $b2$, $b3$ ....) as there are variables taken into account ($b1 + b2$ .... $+ bn = b$).

DOCUMENTATION

For the purpose of determining the values of materials and wages, the parties agree to use the following documents as sources of reference:

1. Materials: prices .... (type of materials)
   (or price indices)
   published by ....
   under the headings ....

2. Wages: wages (including related social charges)
   (or relevant indices)
   published by ....
   under the headings .... (5)

Rules for applying the Clause. In the case of partial deliveries which are invoiced separately, the final price shall be calculated separately for each such delivery.
Period of application of the Clause. The revision clause shall cover the delivery period fixed in the contract, together with any extension thereof granted under Clause 7.2, but shall in no case apply after the date on which manufacture is completed.
Tolerances. Prices shall not be revised unless the application of the formula produces a plus or minus variation of .... (6)
Saving Clause. If the parties wish the revision formula to be adjusted or replaced by a more accurate method of calculation when the plus or minus variation exceeds a certain percentage, they shall expressly so agree.

(1) It is recommended that the parties should, as far as possible, adopt as the initial price the price prevailing at the date of the contract and not at an earlier date. This is normally the contract price less cost of packing, transport and insurance.
(2) Arithmetical or weighted.
(3) Specify the datum period, which may be defined as part or the whole of the delivery period.
(4) If legal social charges are covered by the index, they need not be taken into account again.
(5) Indices relating specifically to the engineering and electrical industries should be used as far as possible.
(6) State the percentage plus or minus variation which must be exceeded before the formula is applied.

Source: United Nations Economic Commission for Europe, 1955.

Leases and rents

It is generally advantageous for both parties to let land or buildings for a number of years at a time. Property owners are notorious for taking undeserved profits, and for this reason rents have in many countries been the object of statutory control. But rentiers' costs do rise. Indexing is one way of avoiding sudden large and possibly unwarranted increases in rents. It makes possible long-term leases even in the face of unknown future levels of inflation. In Finland land leases of fifty years or more have been allowed to include index clauses since June 1968, only two months after the ban. The law on indexing leases and rents has been further loosened since that time.

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It is again hard to know just how many private landlords used indexation. Public authorities have always kept their rents at minimum levels. Rents were often frozen, and then raised by the permissible maximum when controls came off. But some landlords certainly did use the cost-of-living index to regulate their rents.

2. **Wage control:**

(a) Wages may be raised in 1968 in accordance with the collective agreements in force or corresponding contracts, however, taking into consideration what has been agreed and decreed concerning the abolition of the index clause.

(b) Wages may be raised in the course of 1969 in accordance with the agreement entered into by the organisations. If there is failure to agree concerning wage provisions at the time the labour contracts or other pay agreements are made, the matter will be referred for decision to the Prices and Wages Council.

(c) The Prices and Wages Council will have a wage section in which central organisations are represented.

Appendix 2 Abolition of index linkages under the Economic Emergency Powers Act

1. Acceptance of new index accounts by financial institutions has been discontinued and will not be re-introduced later. The index clauses of existing accounts will be applied until 30 November 1968, after which they will cease to be applied. Application of index clauses for credits granted by financial institutions or insurance companies, pension funds and other lenders will cease.

2. Financial institutions may collect an additional annual interest of 1 per cent at the most as long as a sum corresponding to the compensations payable on index deposits has accumulated in the index equalisation accounts controlled by the Bank of Finland.

3. The application of index clauses in rent contracts is prohibited. If rents were raised after 1 October 1967 because of an increase in the index increment payable on debts, the rents will be lowered to correspond to the relief effected in the loan costs.

4. Application of the index clauses in domestic contract work, delivery and merchandise delivery contracts is prohibited. However, the Prices and Wages Council may later permit an increase in these prices if it is necessary to avoid obviously unreasonable pricing.

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The list is arranged in sections as follows:

Theoretical, general and international
United Kingdom
United States
Finland
Brazil
France
Israel
Other countries

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College Algebra

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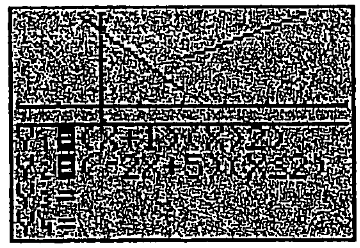
Compositor: Interactive Composition Corporation
Printer and Binder: R. R. Donnelley & Sons
Cover Printer: Phoenix Color Corporation

Library of Congress Cataloging-in-Publication Data
Lial, Margaret L.
College algebra / Margaret L. Lial, E. John Hornsby, Jr., David I. Schneider.—7th ed.
p. cm.
Includes index.
ISBN 0-673-99552-6—0-673-97658-0 (annotated instructor's edition)
1. Algebra. I. Hornsby, E. John. II. Schneider, David I.,
1942- . III. Title
QA154.2L5 1996 96-655
512'.14—dc20 CIP

3 4 5 6 7 8 9 10—DOC—99 98 97

Piecewise-defined functions can be graphed with some graphing calculators. You may need to use dot mode. See the instruction manual for your calculator. The graph will not distinguish between open and closed endpoints, so it is still important to understand what the graph should look like.



$[-2, 6]$ by $[-1, 6]$
Split screen mode

This is the graph of

$$f(x) = \begin{cases} x+1 \text{ if } x > 2 \\ -2x+5 \text{ if } x \le 2. \end{cases}$$

Compare with Figure 30.

EXAMPLE 5
Graphing the greatest-integer function

The symbol $[\![x]\!]$ is used to represent the greatest integer less than or equal to x. For example, $[\![8.4]\!] = 8$, $[\![-5]\!] = -5$, $[\![\pi]\!] = 3$, $[\![-6.9]\!] = -7$, and so on. In general, if $f(x) = [\![x]\!]$,

$$\begin{aligned} &\text{for } 0 \le x < 1, \quad && f(x) = 0, \\ &\text{for } 1 \le x < 2, && f(x) = 1, \\ &\text{for } 2 \le x < 3, && f(x) = 2, \end{aligned}$$

and so on. A graph of $f(x)$ is shown in Figure 32.

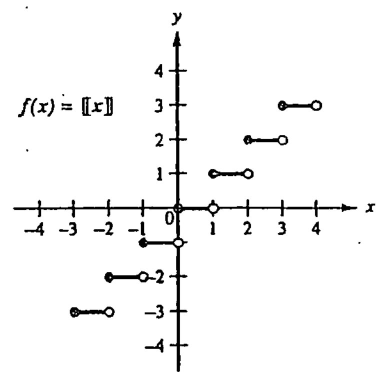
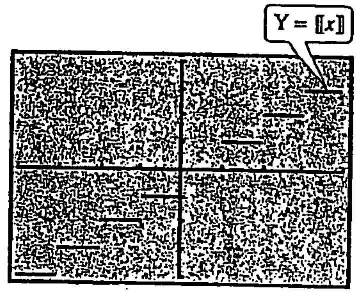


FIGURE 32

The function defined by $f(x) = [\![x]\!]$, discussed in Example 5, is called the **greatest-integer function.** The greatest-integer function is an example of a step function, a function with a graph that looks like a series of steps. Some applications of step functions are included in the exercises.

Graphing calculators have built-in functions, such as LOG, SIN, ABS, and so on. Some have INT for the greatest-integer function. If your calculator does not have this built-in function, you can rewrite it as a piecewise-defined function for the desired domain.



$[-4, 4]$ by $[-4, 4]$

Dot mode

Piecewise-defined functions can be used to describe many everyday situations. The next example gives one instance and others are included in the exercises.

EXAMPLE 6
Applying a piecewise-defined function

Professional basketball player Shaquille O'Neal is 7-foot 1-inch tall and weighs 300 pounds. The table lists his age and shoe size.

Age	*Size*
20	19
21	20
22	21
23	22

(a) Determine a linear function defined by $f(x)$ that models the data where x is Shaquille O'Neal's age and $f(x)$ computes his shoe size. Interpret the slope of the graph of f.

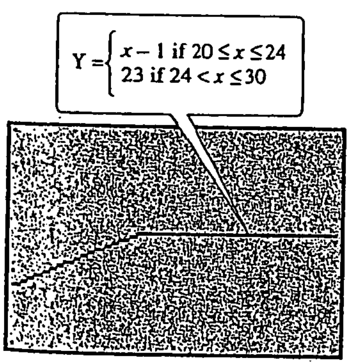
The shoe size is one less than his age, so we let $f(x) = x - 1$. The slope of 1 indicates that his shoe size is increasing at a rate of 1 size per year.

(b) Could $f(x)$ be used to predict O'Neal's shoe size at any age?

No, most people's feet eventually stop growing.

(c) Suppose his feet continue to grow at the present rate and then stop at age 24. Graph a piecewise-defined function that describes his shoe size between the ages of 20 and 30.

On the interval $[20, 24]$, $y = x - 1$, and on $(24, 30]$, $y = 23$. A calculator-generated graph is shown in Figure 33.



$[20, 30]$ by $[15, 30]$
Xscl = 5 Yscl = 5

FIGURE 33

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C 1971

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field) ⟨*stepped* off the curb and started walking down the hill —Dorothy Baker⟩ ⟨*stepped* out on deck to cool himself —E.K. Gann⟩ ⟨*stepped* down from the ladder⟩ ⟨~ aside to let the doctor pass⟩ ⟨the referee *stepped* between the two boxers⟩ b : DANCE ⟨that girl can really ~⟩ 2 a : to go on foot : WALK ⟨what, you are *stepping* westward —Dorothy Wordsworth⟩ ⟨please ~ to the telephone⟩ ⟨*stepped* down to the corner for a newspaper⟩ b *obs* : to move forward : ADVANCE, PROCEED ⟨I am in blood *stepped* in so far —Shak.⟩ c : to go or be on one's way : DEPART — often used with *along* ⟨well, I must ~ along now⟩ d : to move at a brisk or lively pace ⟨they kept us *stepping* all right —W.L.Gresham⟩ 3 a : to put the foot down : TREAD ⟨~ on a rusty nail⟩ b : to press down with the foot ⟨~ on the brake⟩ 4 a : to come as if at a single step ⟨*stepped* into a fortune when his father died⟩ ⟨~ into a good job⟩ b *obs* : to enter suddenly and in a rash or thoughtless manner ⟨in hot blood hath *stepped* into the law —Shak.⟩ 5 : to stand erect with the lower end fixed in a step ⟨the foremast ~*s* abaft the forecastle⟩ ~ *vt* 1 : to take by moving the feet in succession ⟨rose and *stepped* three paces —Rudyard Kipling⟩ 2 a : to move (the foot) in any direction : SET, PLACE ⟨the first man who *stepped* foot on the enemy's soil —S.G.W.Benjamin⟩ b : to move over or travel across on foot : TRAVERSE ⟨proud too . . . of *stepping* this famous pavement —Virginia Woolf⟩ ⟨deer ~ the highways —Grace H. Flandrau⟩ 3 : to go through the steps of : PERFORM ⟨~ a minuet⟩ 4 : to make erect by fixing the lower end in a step ⟨a small pole *stepped* in a block of wood served as a mast —Bernard DeVoto⟩ 5 : to measure by steps ⟨have *stepped* more ground . . . than any man in the country —Samuel Lover⟩ — often used with *off* or *out* ⟨~ off 50 yards⟩ 6 : to provide or furnish with steps : make steps in ⟨~ a key⟩ 7 : to construct or arrange in or as if in steps : build in steps ⟨was . . . *stepped* to ensure that the winter rains did not wash the whole lot into the sea —Brendan Maguire⟩ ⟨the house is *stepped* down the slope —Siegfried Giedion⟩ ⟨craggy peaks with terraces *stepped* up the sides —*Time*⟩ — **step on it** 1 : to increase the speed of a motor vehicle by pressing down on the accelerator 2 : to increase one's speed : hurry up

step- \"\ *comb form* [ME, fr. OE *stēop-*; akin to OFris *stiap-* step-, OHG *stiof-*, ON *stjūp-* step-, OE *āstēpan*, *āstȳpan* to deprive, bereave, OHG *bistiufen* to deprive of children or parents] : related by virtue of a remarriage (as of a parent) and not by blood ⟨*step*aunt⟩ ⟨*step*cousin⟩ ⟨*step*grandchild⟩

step-and-repeat \¦=,=¦=\ *adj* : of, relating to, or employing a method in which successive exposures of a single image are made on a printing surface that is being prepared for gang printing

step back *vi* 1 : to yield ground by moving to the rear ⟨ordered the spectators to *step back*⟩ 2 : RECEDE ⟨end chimneys which *step back* unattached above the second story —*Amer. Guide Series: N.C.*⟩ ~ *vt* : to construct (as a building) in an ascending series of steps or stages of diminishing width : build so that successive stories or groups of stories recede farther and farther from the front, side, or back ⟨an octagonal tower . . . rising sheer to 13 stories and then *stepped back* three times to a height of 327 feet —*Amer. Guide Series: N.Y.*⟩

step bearing *n* : a bearing that supports the lower end of a vertical shaft

step bolt *n* : CARRIAGE BOLT

stepbrother \'=,==\ *n* [ME, fr. *step-* + *brother*] : a son of one's stepparent by a former marriage

step-by-step \¦=(,)=¦=\ *adj* : marked by successive degrees usu. of limited extent : GRADUAL ⟨approach on a *step-by-step* basis a closer association with other nations —Dean Acheson⟩

step-by-step telegraph *n* : an electric telegraph in which each letter of the message is indicated by a pointer on a dial

step chair *n* : a chair convertible into a stepladder

stepchild \'=,=\ *n, pl* **stepchildren** [ME, fr. OE *stēopcild* orphan, fr. *stēop-* step- + *cild* child — more at CHILD] 1 : a child of one's wife or husband by a former marriage 2 : one that fails to receive proper care or attention ⟨music is . . . a ~ in most of our academic institutions —P.H.Lang⟩

step chuck *n* : a lathe chuck with recessed shoulders of decreasing diameters for holding flat round work

step-cline \'=,=\ *n* ['step] : an irregular or interrupted cline

step-cone pulley \'=,=-\ *n* : CONE PULLEY

step cut *n* : a cut for diamonds or esp. colored stones forming a series of straight facets that decrease in length as they recede from the girdle and so give the appearance of steps — compare TABLE CUT

stepdame \'=,=\ *n* [ME, fr. *step-* + *dame*] *archaic* : STEPMOTHER

step dance *n* : a dance in which steps are emphasized rather than gesture or posture; *esp* : a solo dance characterized by clogging, tapping, brushing, or kicking

stepdaughter \'=,==\ *n* [ME *stepdoughter*, fr. OE *stēopdohtor* (akin to MHG *stieftohter*, ON *stjūpdōttir*), fr. *stēop-* step- + *dohtor* daughter — more at STEP-, DAUGHTER] : a daughter of one's wife or husband by a former marriage

step down *vt* 1 : to lower the voltage of (a current) by means of a transformer 2 : to decrease, retard, or mitigate by or as if by steps ⟨*stepping down* the intensity of the myth into mild contemporary equivalents —Malcolm Cowley⟩ ~ *vi* : to retire or resign from a position of power or authority ⟨had *stepped down* from active management of the household —Irving Stone⟩

¹step-down \'=¦=\ *adj* [*step down*] : that decreases, reduces, or retards; *specif* : that decreases voltage ⟨*step-down* transformer⟩

²step-down \'=,=\ *n* -s : a decrease or reduction in size or amount ⟨a *step-down* in dosage⟩

stepfather \'=,==\ *n* [ME *stepfader*, fr. OE *stēopfæder* (akin to OFris *stiapfeder*, MHG *stiefvater*, ON *stjūpfathir*), fr. *stēop-* step- + *fæder* father — more at FATHER] : the husband of one's mother by a subsequent marriage

step fault *n* : DISTRIBUTIVE FAULT

step function *n* : a function of a single real variable in mathematics that remains constant throughout each of a series of adjacent intervals with the constant value varying from interval to interval

step gauge *n* 1 : a compound plug gauge consisting of several short cylindrical gauges of graduated diameters on the same axis 2 : a gauge that consists of a handled body in which a blade slides normally and that is used esp. for measuring shoulders or steps

step grate *n* : a fire grate in which the bars rise like steps

stephan- or **stephano-** *comb form* [Gk, fr. *stephanos* crown, fr. *stephein* to put round one's head, encircle, crown] : crown : halo ⟨*Stephan*urus⟩ ⟨*stephan*ome⟩ ⟨*Stephano*filaria⟩

steph·a·nan·dra \,stefə'nandrə\ *n, cap* [NL, fr. *stephan-* + *-andra*] : a genus of deciduous Japanese and Chinese shrubs (family Rosaceae) with lobed or incised leaves and flowers with four or more petals and a single pistil that produces a follicle

steph·a·ne \'stefə(,)nē\ *n* -s [Gk *stephanē*, fr. *stephein* to put round one's head] : a headdress that consists of a metal band widest in the middle over the forehead and growing narrower toward the temples and that is often seen in ancient Greek statues of divinities

ste·pha·nian \stə'fānēən, -nyən\ *adj, usu cap* [F *stéphanien*, fr. (Sanctus) *Stephanus* ...

steph·a·no·fil·a·ri·a·sis \,==(,)=,filə'rīəsəs\ *n* [NL, fr. *Stephanofilaria* + *-sis*] : infestation with or disease caused by worms of the genus *Stephanofilaria*

steph·a·no·kon·tae \-'kän·(,)tē\ *n pl, cap* [NL, fr. *stephan-* + *-kontae* (as in *isokontae*)] *in some classifications* : a class or subclass that is approximately equivalent to Oedogoniales and includes green algae having zoospores with a crown or chaplet of cilia — compare HETEROKONTAE, ISOKONTAE

steph·a·nome \'stefə,nōm\ *n* -s [*stephan-* + Gk *-nomos* distributor (fr. *nemein* to distribute) — more at NIMBLE] : an instrument for measuring the angular dimensions of fogbows and halos

steph·a·no·tis \,=='nōd·əs\ *n* [NL, fr. Gk *stephanōtis* fit for a crown, fr. *stephanos* crown] 1 *cap* : a genus of Old World tropical woody vines (family Asclepiadaceae) with fragrant white flowers whose corolla has a cylindrical dilated tube and spreading limb — see MADAGASCAR JASMINE 2 -ES : any plant of the genus *Stephanotis*

steph·a·nu·rus \-'nyu̇rəs\ *n, cap* [NL, fr. *stephan-* + *-urus*] : a genus of nematode worms (family Strongylidae) including the kidney worm of swine

step-hop \'=,=\ *n* : a dance step consisting of a forward step followed by a hop on the same foot

step in *vi* [ME *stepen in*, fr. *stepen* to step + *in* — more at STEP] 1 : to make a brief informal visit : drop in ⟨*step in* and take your chocolate with her —Elizabeth Inchbald⟩ 2 : to enter into an affair or dispute often without invitation, permission, or welcome : INTERVENE ⟨if the local communities do not meet their responsibilities . . . the federal and state governments will *step in* —C.F.Hood⟩

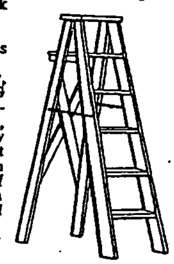
¹step-in \'=¦=\ *adj* [*step in*] 1 *of clothing* : put on by being stepped into ⟨*step-in* dress⟩ ⟨*step-in* moccasins⟩ 2 : of or relating to step-in clothing ⟨*step-in* styles⟩

²step-in \'=,=\ *n* -s : an article of step-in clothing: as a : a shoe that resembles but usu. has a higher vamp than a pump and that often has concealed goring or elasticized top edging b **step-ins** *pl* : a woman's brief panties

step index *n* : an index cut into the fore edge of a book in the form of steps with the edge of each set of leaves preceding an indexed leaf being cut away — compare TAB INDEX, THUMB INDEX

step joint *n* : a joint used in fastening together the ends of two rails of different height and section

stepladder \'=,==\ *n* : a portable set of flat broad steps or treads with a frame hinged to the back for steadying



stepladder

step·less \'=-ləs\ *adj* : having no steps

steplike \'=,=\ *adj* : resembling a series of steps

stepmother \'=,==\ *n* [ME *stepmoder*, fr. OE *stēopmōdor* (akin to MHG *stiefmuoter*, ON *stjūpmōthir*), fr. *stēop-* step- + *mōdor* mother — more at STEP-, MOTHER] 1 : the wife of one's father by a subsequent marriage 2 : one that fails to give proper care or attention ⟨the monastery had got the credit of founding a school but had . . . been a ~ to it —*Contemporary Rev.*⟩ 3 *dial* : HANGNAIL

step·moth·er·ly *adj* : of, relating to, or befitting a stepmother

step·ney \'stepnē, -ni\ or **stepney wheel** *n* -s *often cap S* [prob. fr. *Stepney* Street, Llanelly, Wales, where it was orig. manufactured] *Brit* : a spare spokeless automobile wheel with inflated tire

step-off \'=,=\ *n* -s [fr. *step off*, v.] 1 : an act or instance of stepping off 2 a : an abrupt dropping off of a shore line into deep water b : a place where such a dropping off occurs

step-on \'=¦=\ *adj* [fr. *step on*, v.] : opened by means of a pedal ⟨14-quart *step-on* can in chrome-plated steel —*advt*⟩

step out *vi* 1 : to go away from a place usu. for a short distance and for a short time ⟨just *stepped out* for a while —Erskine Caldwell⟩ 2 : to go or march at a vigorous or increased pace 3 : DIE 4 : to engage in social activities : lead an active social life ⟨has really been *stepping out* this past year⟩ 5 : to be unfaithful — usu. used with *on* ⟨hadn't been married two months before I knew he was *stepping out* on me —James Jones⟩

step-out \'=,=\ *n* -s [*step out*] : a well drilled outside but near a proved oil field

stepparent \'=,==\ *n* [*step-* + *parent*] : the husband or wife of one's mother or father by a subsequent marriage

steppe \'step\ *n* -s [Russ *step'*, fr. ORuss, lowland] 1 : one of the vast tracts in southeastern Europe or Asia that are usu. level and without forests 2 : arid land characterized by xerophilous vegetation and found usu. in large tracts and in regions of extreme temperature range and loess soil — compare GRASSLAND, PAMPA, PLAIN, PRAIRIE, SAVANNA

steppe cat *n* : MANUL

stepped \'stept\ *adj* [¹*step* + *-ed*] 1 : having a step or a series of steps : arranged or constructed in steps ⟨~ pyramids⟩ ⟨~ gables⟩ 2 *of an arch* : consisting of a series of concentric arches of diminishing radius set within one another

stepped footing *n* : a footing in which the desired width is secured by a series of steps in about the proportion of one unit of horizontal dimension to two units of vertical dimension

stepped gable *n* : a gable that diminishes in width by corbiesteps

stepped gauge *n* : STEP GAUGE

stepped gear wheel *n* : a gear wheel with two or more complete circular sets of teeth arranged adjacently on the same rim so that the corresponding teeth in the various sets form a series of steps

stepped key *n* : BIT KEY

stepped pulley *n* : a cone pulley with steps

stepped rack *n* : a rack made to mesh with a stepped gear

stepped screw *n* : an interrupted screw the divisions of whose surface are stepped

stepped-up \'=¦=\ *adj* : AUGMENTED, ACCELERATED, INTENSIFIED ⟨a *stepped-up* sales campaign⟩

steppeland \'=,=\ *n* : STEPPE 2

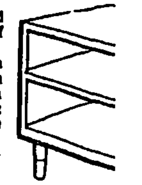
step·per \'stepə(r)\ *n* -s : one that steps: as a : a horse with high action b : DANCER

stepping *n* -s [ME, fr. gerund of *steppen* to step — more at STEP] 1 : an act or instance of moving the feet (as in walking) 2 a (1) : lumber suitable for steps (2) : wood members esp. formed for use in constructing step treads b : an export grade of yellow pine and fir

stepping-off place \¦==¦=-\ *n* 1 : the outbound end of a transportation line 2 : a place from which one departs for unknown territory

stepping-stone \'==,=\ *n* [ME] 1 a : a stone on which to step in walking (as in crossing a stream) b : a raised stone for facilitating an ascent or descent; *specif* : HORSE BLOCK 2 : a means of progress or advancement ⟨the law was a *stepping-stone* to a career in politics —G.S.Bryan⟩ 3 : a place for a break in or as if in a journey ⟨this *stepping-stone* for airborne supplies on their way to far-flung fronts below the equator —Howell Walker⟩

step table *n* : a small table surmounted ... several progressively diminished shelves



st

step terrace *n* : a stepped terrace on the levels of which farming is done

step trench *n* : a trench cut in a series of steps from the base to the top of a mound for determining the cultural levels of an archaeological site

step turn *n* : a turn executed in a downhill traverse by lifting the upper ski from the ground, placing it in the desired direction, weighting it, and bringing the other ski parallel

step up *vt* 1 : to increase the voltage of (a ... a transformer 2 : to increase, augment, o... by steps ⟨the amount of salt mined can be ... —R.E.Crist⟩ ⟨radio and television have ... tempo of the news —F.L.Mott⟩ 3 : to ... ⟨you're going to be *stepped up* to head cler... ~ *vi* 1 : to come forward often in an inter... or unguarded manner ⟨time for teachers to ... there is nothing wrong with teaching ... Binney⟩ 2 : to undergo an increase ⟨wo... *up* —*Kiplinger Washington Letter*⟩ 3 : to ... ⟨*stepping up* to the chief executive's chair –...

¹step-up \'=¦=\ *adj* [*step up*] : that incre... advances: as a *of a transformer* : that incre... *lease* : that provides for increases in rent...

²step-up \'=,=\ *n* -s : an increase or advan... ⟨a *step-up* in production⟩

step ward *n* : the ward of a lock or key ne...

stepway \'=,=\ *n* : a flight of steps

step wedge *or* **step tablet** *n* : an optical ... change in transmittance with distance alon... in discrete adjacent steps

¹stepwise \'=,=\ *adv* : in a stepwise manne...

²stepwise \"\ *adj* 1 : marked by or as if ... ⟨achieved in a ~ struggle for social refor... ⟨a ~ chemical reaction⟩ 2 : moving by ste... cal tones ⟨a short melodic line . . . contain... gressions —Paul Hindemith⟩

-ster \stə(r), *following a voiced consonant*, ... -ztə- *or* -stə-\ *n suffix* -s [ME *-ster*, *-ste*... *-estre* female agent; akin to MD *-ster*] 1 ... handles or operates ⟨spin*ster*⟩ ⟨tap*ster*⟩ ⟨t... that makes or uses ⟨song*ster*⟩ ⟨pun*ster*⟩ ... associated with or participates in ⟨game*ste*...

ster *abbr* 1 sterilization; sterilizer 2 sterli...

ste·ra·di·an \stə'rādēən\ *also* **sterad** \'st... [*steradian* fr. *stere-* + *radian*; *sterad* short ... unit of measure of solid angles that is exp... angle subtended at the center of the sphere ... surface whose area is equal to the square o... sphere

ste·ra·di·an·cy \stə'rādēənsē\ *n* -ES [*stera*... radiant flux from a surface per steradian ... specified direction per unit area of cross secti... perpendicular to that direction

ster·co·bi·lin \,stərkō'bīlən\ *n* -s [ISV *ste*... excrement) + *bil-* (fr. L *bilis* bile) + *-in* ... : UROBILIN; *esp* : a brown levorotatory pig... found in feces and urine

ster·co·bi·lin·o·gen \,==,bī'linəjən\ *n* -s [... *-o-* + *-gen*] : UROBILINOGEN

ster·co·ra·ceous \¦stərkə¦rāshəs\ *adj* [L *ste*... *-aceous*] : of or relating to dung : being or ...

ster·co·ral \'stərkərəl\ *adj* [ML *stercorali*... *stercus* excrement + *-alis* -al — more at DREC... to, containing, produced by, or being dung... ing in or feeding on dung

stercoral pocket *n* : a pouched diverticulu... testine of a spider that serves as a reservoir ...

ster·co·ra·nism \'stərkərə,nizəm\ *n* -s *oft*... *coranista* Stercoranist + E *-ism*] : the body ... to Stercoranists

ster·co·ra·nist \-,nəst\ *also* **ster·co·ra**... ¦ra(a)rēən\ *n* -s *often cap* [*stercoranist* fr. ML ... *stercoran-* (irreg. fr. L *stercor-*, *stercus* excr... -ist; *stercorarian* fr. L *stercorarius* stercoral ... who holds that the consecrated elements in ... subject to natural processes (as of digestion)

ster·co·ra·ri·i·dae \,stərkərə'rīə,dē\ *n pl*, ... *Stercorarius*, type genus (fr. L *stercorari*... *stercor-*, *stercus* excrement + *-arius* -ary) ... family of long-winged sea birds (suborder ... the jaegers and skuas and being sometimes ... family of Laridae

ster·co·rary \'==,rerē\ *n* -ES [ML *stercorari*... rary, fr. neut. of L *stercorarius* stercoral] *arc*... a covered pit) for the storage of manure ... weather

ster·co·ra·tion \,=='rāshən\ *n* -s [L *stercora*... fr. *stercoratus* (past part. of *stercorare*) + ... 1 *archaic* : the act of dressing with manure 2 ...

ster·co·ric·o·lous \¦=kə¦rikələs\ *adj* [L *ster*... crement + E *-i-* + *-colous*] : living in dung

ster·co·rite \'stərkə,rīt\ *n* -s [L *stercor-*, *st*... : a native microcosmic salt $HNaNH_4PO_4{\cdot}4H$... guano

ster·cov·o·rous \(')stər¦kävərəs\ *adj* [L *sterc*... E *-o-* + *-vorous*] : SCATOPHAGOUS — used esp...

ster·cu·lia \stə(r)'kyülēə\ *n* [NL, fr. L *S*... cultivation and manuring, fr. *stercus* manure ... the fetid odor of some of the species — more ... : a genus of tropical trees or shrubs (family Ste... ing palmate leaves, small paniculate unisexual ... anthers, and an ovary with 5 cells that become ... in the fruit — see BOTTLE TREE, KALUMPANG ... of the genus *Sterculia* — see STERCULIA GUM

ster·cu·li·a·ce·ae \=,=lē'āsē,ē\ *n pl, cap* [N... type genus + *-aceae*] : a large family of herbs, ... (order Malvales) distinguished mainly by ... monadelphous stamens and 2-celled anthers — ... — **ster·cu·li·a·ceous** \=¦=='āshəs\ *adj*

ster·cu·li·ad \='=lē,ad\ *n* -s [NL *Sterculia* + ... of the family Sterculiaceae

sterculia gum *n* : any of several vegetable gums ... in properties to tragacanth and often used as s... and that are obtained from tropical Asiatic tre... *Sterculia* and *Cochlospermum* (esp. *S. urens* an...

ster·cu·lic acid \(')stər¦kyülik-\ *n* [NL *Ster*... : a crystalline unsaturated fatty acid $C_{19}H$...

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0-87779-002-7 (dark tan Fabrikoid)
0-87779-003-5 (2 volumes, buff buckram)
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United States Court of Appeals for the Federal Circuit

2006-1599, -1600
(Reexamination Nos. 90/005,841 and 90/005,842)

IN RE TRANS TEXAS HOLDINGS CORP.

Judgment

ON APPEAL from the	United States Patent and Trademark Office, Board of Patent Appeals and Interferences
in CASE NO(S).	2005-2642, -2643

This CAUSE having been heard and considered, it is

ORDERED and ADJUDGED:

AFFIRMED

ENTERED BY ORDER OF THE COURT

DATED AUG 22 2007

Jan Horbaly /vs

Jan Horbaly, Clerk

ISSUED AS A MANDATE: SEP 12 2007

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UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

By: Valerie [signature] Date: 9/12/07

United States Court of Appeals for the Federal Circuit

2006-1599, -1600
(Reexamination Nos. 90/005,841 and 90/005,842)

IN RE TRANS TEXAS HOLDINGS CORP.

David L. Parker, Fulbright & Jaworski L.L.P., of Austin, Texas, argued for appellant. With him on the brief was Marcy Hogan Greer. Of counsel was Shafeeqa Watkins Giarratani.

William LaMarca, Associate Solicitor, United States Patent and Trademark Office, of Arlington, Virginia, argued for the Director of the United States Patent and Trademark Office. With him on the brief was Thomas L. Stoll, Associate Solicitor. Of counsel was Stephen Walsh, Acting Solicitor.

Appealed from: United States Patent and Trademark Office
Board of Patent Appeals and Interferences

United States Court of Appeals for the Federal Circuit

2006-1599, -1600
(Reexamination Nos. 90/005,841 and 90/005,842)

IN RE TRANS TEXAS HOLDINGS CORP.

DECIDED: August 22, 2007

Before MICHEL, Chief Judge, MAYER and DYK, Circuit Judges.

DYK, Circuit Judge.

Appellant Trans Texas Holdings Corp. ("Trans Texas") appeals the decision of the Board of Patent Appeals and Interferences ("Board") in Reexamination Nos. 90/005,841 and 90/005,842. The Board affirmed the examiner's rejection of all of the claims of U.S. Patent No. 5,832,461 (filed Oct. 23, 1991) ("'461 patent") and U.S. Patent No. 6,052,673 (filed Nov. 2, 1998) ("'673 patent") as obvious under 35 U.S.C. § 103. We affirm.

BACKGROUND

I

Trans Texas is the assignee of both the '461 patent and the '673 patent. The '673 patent is a continuation of the '461 patent. The patents' specifications, which are nearly identical, describe a system of inflation-adjusted deposit and loan accounts. '461 patent col.2 ll.55-59; '673 patent col.2 ll.55-59. By adjusting the interest paid on deposit accounts, or received on loan accounts, to compensate for inflation, the patented

system purports to insulate the value of assets from inflationary fluctuations. In addition, the patented system seeks to match, or "hedge," any increased interest a financial institution must pay to depositors as a result of inflation adjustments with the increased inflation-adjusted interest payments it receives from borrowers, thereby providing stability to the financial institution. '461 patent col.3 ll.27-37; '673 patent col.2 ll.27-37 ("[D]uring times of inflation . . . negative cash flows attributable to . . . deposit accounts will be compensated for by incoming payments on loan accounts.").

A

The '461 patent has three independent claims, claims 1, 24, and 36. Independent claim 1 claims "[a]n investment system for providing an improved capital structure for an institution" composed, basically, of a deposit account and an account management data processor. '461 patent col.25 l.64-col.26 l.51. The claimed deposit account has a principal component representing the initial cash investment of the depositor and an accrual component representing interest paid that has both a fixed interest and a variable interest component. Id. col.26 ll.39-42. Claim 1 notes that the "deposit accrual component" is adjusted "in a manner responsive to the rate of inflation," id. (emphasis added), which the specification defines as "directly responsive to a market indicator of prior actual inflation and it is not meant to include the market's expectation of future inflation," id. col.3 ll.12-14 (emphasis added).[1] Claim 1 also specifies that the data processor includes means for "retiring the fixed interest component" and "paying

[1] The specification definition states in full: "Responsive to the rate of inflation, as used herein, means directly responsive to a market indicator of prior actual inflation and it is not meant to include the market's expectation of future inflation." '461 patent col.3 ll.11-14.

the deposit principal component" according to schedules over the term of the deposit account. Id. col.26 ll.48-51.[2]

Independent claim 24 is generally similar to claim 1 for purposes of this appeal and includes the "responsive to the rate of inflation" limitation. Id. col.28 ll.47-59. It excludes claim 1's reference to retiring the fixed interest and paying the principal according to schedules. Id. Independent claim 36 is similar to claim 1 for purposes of this appeal but covers both deposit and loan accounts. Id. col.29 l.25-col.30 l.9. Similar to claim 1, it claims a "means for adjusting the amount in the deposit account in a manner responsive to the rate of inflation" and a "means for determining the amount in the loan accrual component in a manner responsive to the rate of inflation." Id. col.29

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2 Claim 1 states in full:

> An investment system for providing an improved capital structure for an institution comprising:
>
> means for establishing data representative of at least one deposit account for a term, the deposit account having a deposit principal component and a deposit accrual component, the deposit accrual component having a fixed interest component and a variable interest component; and
>
> an account management data processor for servicing the deposit account over the term, including:
>
>> means for determining the rate of inflation;
>>
>> means for adjusting the amount in the deposit accrual component in a manner responsive to the rate of inflation;
>>
>> means for retiring the fixed interest component by a first schedule over the term; and
>>
>> means for paying the deposit principal component according to a second schedule over the term.

'461 patent col.25 l.64-col.26 l.51.

l.37-col.30 l.3 (emphases added). Most of the '461 patent's dependent claims were not argued separately on appeal and thus stand or fall with their corresponding independent claim. See In re Dance, 160 F.3d 1339, 1340 n.2 (Fed. Cir. 1998). Some of the dependent claims include other limitations described below.

B

The '673 patent has four independent claims, claims 1, 9, 22, and 25. Claim 1 claims a "method of managing financial accounts" by providing deposit and loan accounts that are adjusted "as a function of a rate of inflation," "paying the deposit accounts," and "receiving repayment of the loan account." '673 patent col.25 l.60-col.26 l.42. Claim 1 also recites the use of "an account data processor." Id. col.26 l.37.[3] Claim 9 claims a method whereby an institution provides a deposit account to a

[3] Claim 1 states in full:

> A method of managing financial accounts comprising:
>
> providing a plurality of deposit accounts with a financial institution;
>
> adjusting the amount in each deposit account as a function of a rate of inflation;
>
> providing at least one loan account with said financial institution using funds deposited with the financial institution;
>
> adjusting the amount in the loan account as a [f]unction of a rate of inflation using an account data processor,
>
> paying the deposit accounts; and
>
> receiving repayment of the loan account by said financial institution in a manner where the funds in the loan account obtain a rate of return responsive to a rate of inflation.

'673 patent col.25 l.60-col.26 l.42.

depositor, uses a portion of the funds deposited to obtain a financial instrument "whose rate of return adjusts with inflation," and pays the "depositor a rate of return on funds . . . based on a rate of inflation." Id. col.26 l.61-col.27 l.7 (emphases added).[4] Claim 22 is nearly identical to claim 9, except that it calls for the institution to obtain "a mortgage secured by real estate," rather than "a financial instrument." Id. col.27 l.41-col.28 l.10. Claim 25 is also similar to claim 9 for purposes of this appeal, except that it specifies that the financial instrument pays "the inflation-adjusted principal component at the end of the term," which the parties refer to as "balloon payments." Id. col.28 l.16-35. None of the dependent claims of the '673 patent was argued separately on appeal, and they therefore stand or fall with their independent claim. See Dance, 160 F.3d at 1340 n.2.

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[4] Claim 9 states in full:

> A method for an institution to manage at least part of a program to provide a depositor of funds a rate of return on said funds variable with a rate of inflation, comprising:
>
> providing a deposit account by the institution for receiving said funds from said depositor;
>
> allocating at least a portion of said funds for obtaining an asset whose rate of return adjusts with inflation;
>
> using said allocated funds to obtain said asset whose return adjusts with inflation and is determined using a dataprocessor, said asset comprising a financial instrument having an obligated rate of return indexed to a rate of inflation; and
>
> paying said depositor a rate of return on funds relived based on a rate of inflation.

'673 patent col.26 l.61-col.27 l.7.

On October 6, 2000, Trans Texas requested reexamination of the '461 and '673 patents based on a substantial new question of patentability. The United States Patent and Trademark Office ("PTO") granted this request on December 6, 2000, and initiated separate reexamination proceedings for each patent.

II

A

In the course of the reexamination proceeding, Trans Texas urged that the PTO was bound by a claim construction rendered in an earlier infringement proceeding to which the PTO was not a party. On October 12, 1999, Trans Texas had filed a complaint against Pimco Advisors, L.P. in the United States District Court for the Western District of Texas, alleging infringement of the '461 and '673 patents. On August 28, 2000, the district court had issued its claim construction ruling, which adopted the definition of the term "responsive to the rate of inflation" found in the specification, that is, it held that the term should be defined as "directly responsive to a market indicator of prior actual inflation and is not meant to include the market's expectation of future inflation." Trans Texas Holdings Corp. v. Pimco Advisors, L.P., No. 99-CA-658, slip op. at 10 (W.D. Tex. Aug. 28, 2000) ("Markman Order"). Relying on language in the accompanying district court opinion, Trans Texas urges that the district court also interpreted the "responsive to the rate of inflation" language to require a continuous, one-to-one relationship between inflation and adjustments. See id. at 12 ("The '461 patent uses the phrase 'responsive to the rate of inflation' which more clearly imparts a one-to-one correlation."). For purposes of this appeal, we will assume that Trans Texas's interpretation of the district court order is correct. The district court also

held that the term "as a function of the rate of inflation" in claim 1 of the '673 patent had the same meaning as the term "responsive to the rate of inflation." Id. at 12. The district court construed the term "based on the rate of inflation" in claims 9 and 25 of the '673 patent "to require the rate of return to be directly related to the rate of inflation." Id. at 12-13.

The parties then reached a settlement before trial, and the district court issued an "Order of Dismissal with Prejudice" on January 8, 2001.

B

On February 11, 2002, the examiner mailed final office actions in the reexamination proceedings rejecting all of the claims of the '461 and '673 patents as obvious under 35 U.S.C. § 103. The primary issue before the examiner was the construction of the terms "responsive to the rate of inflation" and "as a function of a rate of inflation." In holding the claims unpatentable, the examiner principally relied on Santosh Mukherjee & Claire Orlans, Indexation in an Inflationary Economy: A Case Study in Finland, Vol. XL, Broadsheet No. 551, PEP The Social Science Institute, April 1975, at 50-73, 106-111 ("Mukherjee"). Mukherjee discusses the decision of banks in Finland in the 1950s to "adjust both their loans and deposits for inflation, on the basis of quarterly inspections of the cost-of-living index." Id. Among other accounts, it describes "A" deposit accounts, which provided "100 per cent index compensation" for every one percent increase in the cost of living index.[5] That is, for every one percent increase in

[5] The predecessor of "A" accounts had required an initial cost-of-living index value of 106 before compensation was paid and had only paid compensation for every two percent increase in the cost-of-living index. However, since the 106 value was reached at the beginning of 1956, this requirement no longer existed when A accounts

the cost of living index, the capital was increased by one percent. Mukherjee also discloses that banks charged an inflation-adjusted "surcharge" on their loans in order to provide the funds needed for fully inflation-adjusted deposit accounts. It notes that "[t]he amount of the surcharge was usually fixed according to the proportion of the bank's deposits benefiting by index adjustment, so that the bank could just balance its commitments." Id. Although Mukherjee "lacks[] an explicit recitation of the data-processor for account management," the examiner concluded that U.S. Patent No. 4,774,663 (filed Nov. 21, 1983) ("Musmanno") "demonstrates that it was notoriously well-known to employ data-processors to manage plural accounts" and therefore it would have been obvious to a person of ordinary skill in the art to apply Musamanno's data processor to Mukherjee.

On March 25, 2002, Trans Texas appealed the examiner's decisions on both the '461 and '673 patents to the Board. Trans Texas first argued that under our decision in In re Freeman, 30 F.3d 1459 (Fed. Cir. 1994), issue preclusion bound the Board to apply the district court's claim construction of the terms "responsive to the rate of inflation" and "as a function of a rate of inflation." The Board, in similar but separate opinions for each reexamination proceeding, rejected this argument. The Board held that a different claim construction standard applies in PTO proceedings, giving claims "their broadest reasonable interpretation consistent with the specification." See Ex Parte Trans Texas Holdings Corp., No. 2005-2642, Reexamination No. 90/005,841, slip op. at 4 (B.P.A.I. May 26, 2006) ("'461 Board Decision"); Ex Parte Trans Texas Holdings

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were first offered in January 1957. Similarly, the A accounts were made "more sensitive" than the predecessor accounts, paying compensation for one percent increases in the cost-of-living index.

Corp., No. 2005-2643, Reexamination No. 90/005,842, slip op. at 4 (B.P.A.I. May 26, 2006) ("'673 Board Decision"). The Board also concluded that the district court's claim construction was not "necessary to the judgment rendered in the previous action" in light of the pre-trial settlement and dismissal. '461 Board Decision at 5-6; '673 Board Decision at 5-6.

Alternatively, Trans Texas argued that, even apart from issue preclusion, "the claims require a continuous (i.e., nonstepped) relationship such that different amounts of prior actual inflation will result in different inflation adjustments." '461 Board Decision at 7; see also '673 Board Decision at 7. The Board disagreed. It noted the specification's definition of "responsive to the rate of inflation"—"directly responsive to a market indicator of prior actual inflation and it is not meant to include the market's expectation of future inflation." '461 Board Decision at 7. The Board concluded that this "was meant to emphasize that the calculations of inflation adjustments must be based on the market indicator data which represents prior actual inflation." Id. (emphasis in original). Relying as well on the dictionary definition of "directly," the Board concluded that the claims were broad enough to cover non-continuous adjustments. '461 Board Decision at 7-8; '673 Board Decision at 9.

The Board upheld the examiner's obviousness rejection of all of the claims of the '461 and '673 patents based on these constructions and its interpretation of other claim terms. It concluded that claims 24-26, 28-32, 34-37, and 38-44 of the '461 patent and claims 1-24 of the '673 were unpatentable over Mukherjee in view of Musmanno. The Board rejected the remaining claims of the '461 and '673 patents over Mukherjee in view of Musmanno and additional references.

Trans Texas timely appealed the decisions, and we consolidated the appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A) (2000). We review questions of issue preclusion and claim construction without deference. See Shell Petroleum, Inc. v. United States, 319 F.3d 1334, 1338 (Fed. Cir. 2003) (issue preclusion); Cybor Corp. v. FAS Techs., Inc., 138 F.3d 1448, 1455 (Fed. Cir. 1998) (claim construction).

DISCUSSION

I

Trans Texas first argues that the Board erred in construing the term "responsive to the rate of inflation" in the '461 patent and the related terms "as a function of a rate of inflation" and "based on a rate of inflation" in the '673 patent. Trans Texas has treated these terms as equivalent and focused on the "responsive to the rate of inflation" limitation, and we will do likewise.

A

Trans Texas primarily argues that the Board should have given preclusive effect to the district court's Markman order, which construed "responsive to the rate of inflation" to mean "directly responsive to a market indicator of prior actual inflation and is not meant to include the market's expectation of future inflation." Markman Order at 15. As discussed above, we assume, as Trans Texas argues, that the district court construed the term to require a "continuous, one-to-one correlation with the inflation rate." Appellant's Br. 20; see also Markman Order at 12.

Traditionally, issue preclusion, also known as collateral estoppel, applied only where the same parties to an earlier proceeding were involved in later litigation involving

the same issue. See Restatement (Second) of Judgments § 27 (1982); Id. § 29 Reporter's Note. More modern decisions in some circumstances apply issue preclusion even where the parties to the subsequent suit are not the same. See Parklane Hosiery Co. v. Shore, 439 U.S. 322, 326-33 (1979); Restatement (Second) Judgments § 29. The latter doctrine is known as non-mutual collateral estoppel, and it is this latter doctrine that Trans Texas relies on here.

Issue preclusion is not warranted in this case because the PTO was not a party to the earlier litigation. Our case law has identified four prerequisites to the application of issue preclusion: "(1) identity of the issues in a prior proceeding; (2) the issues were actually litigated; (3) the determination of the issues was necessary to the resulting judgment; and, (4) the party defending against preclusion had a full and fair opportunity to litigate the issues." Jet, Inc. v. Sewage Aeration Sys., 223 F.3d 1360, 1365-66 (Fed. Cir. 2000) (emphasis added).

The PTO as "the party against whom the earlier decision is asserted" thus must have been accorded "a 'full and fair opportunity' to litigate that issue in the earlier case." Allen v. McCurry, 449 U.S. 90, 95 (1980); Freeman, 30 F.3d at 1467 (Fed. Cir. 1994). However, the PTO was not even a party to the earlier district court litigation and cannot be bound by its outcome. Trans Texas nevertheless argues that this requirement should somehow be excused because the PTO proceedings were ex parte. This argument simply makes no sense. The PTO is plainly a party to these appeal proceedings, and if it were not treated as a party, there would be no basis for even considering the application of issue preclusion in the first place.

We have never applied issue preclusion against a non-party to the first action. In fact, the Supreme Court has specifically held that "litigants . . . who never appeared in a prior action[] may not be collaterally estopped without litigating the issue. . . . Due process prohibits estopping them despite one or more existing adjudications of the identical issue which stand squarely against their position." Blonder-Tongue Labs., Inc. v. Univ. of Ill. Found., 402 U.S. 313, 329 (1971); see also Parklane Hosiery, 439 U.S. at 327 n.7 ("It is a violation of due process for a judgment to be binding on a litigant who was not a party or a privy and therefore has never had an opportunity to be heard."); Restatement (Second) of Judgments § 29 Reporter's Note ("The proposition that a non-party cannot be bound by a judgment, unless he is represented by a party or has interests that are derivative from a party, is a rule of Constitutional law.").[6]

Recognizing the general rule against collaterally estopping a non-party, Trans Texas asserts that it somehow represented the PTO's interests in the district court action. However, the "presumption that nonparties are not bound by a judgment" can only be rebutted in limited circumstances, such as when the non-party was in privity with a party, has interests that are derivative from a party, or "participate[d] in an active and controlling way" in the litigation. See 18A Charles Alan Wright, et al., Federal Practice & Procedure § 4449 (2d ed. 2002); Restatement (Second) of Judgments § 29 Reporter's Note. The PTO's interests were not represented in the earlier litigation even though Trans Texas there urged that the district court reject the construction that the district

[6] While the Due Process Clause of the Fifth Amendment does not apply to the government, see South Carolina v. Katzenbach, 383 U.S. 301, 323-24 (1966), the procedural protections afforded to private parties in the res judicata and collateral estoppel context also apply to the government, see United States v. Stauffer Chem. Co., 464 U.S. 165, 170 (1984).

court adopted. Since the PTO was not a party to the district court litigation, issue preclusion does not apply.

Contrary to Trans Texas's argument, our decision in Freeman does not require the application of issue preclusion. In Freeman, we held that a patentee in a PTO proceeding was barred by issue preclusion from asserting a claim construction already rejected in a district court infringement action brought by the patentee against a third party. 30 F.3d at 1469. Nothing in Freeman suggests that issue preclusion could be applied against the PTO or another non-party to the infringement proceeding.[7]

B

Alternatively, Trans Texas urges that the Board erroneously rejected its proposed claim construction and that the claims require continuous, one-to-one adjustments. It is not entirely clear what Trans Texas means by "continuous" or "one-to-one." Any inflation-adjustment is subject to the available inflation data. That is, it is limited by the way in which inflation data are reported, both in terms of the frequency of reporting (e.g., monthly, quarterly, yearly, etc.) and the specificity of reporting (i.e., how many decimal places the rate of inflation is carried out). Thus, no inflation-adjustment system can truly be "continuous" and "one-to-one" with the true rate of inflation. Instead, as best we can understand it, Trans Texas's argument is that for every increase in the reported rate of inflation, there must be an immediate and equal inflation adjustment. We understand this argument to be an attempt to distinguish the Mukherjee prior art

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[7] In light of our resolution of Trans Texas's issue preclusion argument, we have no need to decide whether non-mutual collateral estoppel against the government would be permissible at all in the circumstances of this case. See United States v. Mendoza, 464 U.S. 154 (1984).

reference, which did not disclose an immediate inflation adjustment to deposit accounts for every increase in the rate of inflation. Instead, increases were only made when the increase in the rate of inflation reached one percent.[8]

Trans Texas's argument is not persuasive. Claims are given "their broadest reasonable interpretation, consistent with the specification, in reexamination proceedings." In re Yamamoto, 740 F.2d 1569, 1571 (Fed. Cir. 1984). The term "responsive to the rate of inflation" is defined in the specification as "mean[ing] directly responsive to a market indicator of prior actual inflation and it is not meant to include the market's expectation of future inflation." '461 patent col.3 ll.11-14. As the Board noted, the specification's definition only requires that the inflation adjustment be "directly responsive" to a market indicator of inflation. There is nothing in the specification or the prosecution history that requires an immediate inflation-adjustment every time the rate of inflation increases. Trans Texas argues that immediate responsiveness is the only construction consistent with the specification because "each of the examples in the '461 specification . . . [is] adjusted on a one-for-one basis." Appellant's Br. 19. Even if the examples are so limited (which the PTO disputes), Trans Texas's argument conflicts with our decision in Phillips v. AWH Corp., 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In Phillips, we held that while "the specification [should be used] to interpret the meaning of a claim," courts must not "import[] limitations from the specification into the claim." Id.

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[8] Trans Texas also points out that some of the deposit accounts in Mukherjee had features requiring: (1) that a threshold value be exceeded before any inflation-adjustment was made; (2) a proportional adjustment (i.e., every one point inflation increase leads to a one-half percent inflation-adjustment). Trans Texas argues that these accounts were not "directly responsive" to the rate of inflation. This is beside the point given the disclosures described in the text above with respect to other accounts that did not include such limiting features.

at 1323. We specifically noted that it is improper to "confin[e] the claims to th[e] embodiments" found in the specification, as Trans Texas asks us to do. Id.

Under Phillips, dictionary definitions are also pertinent. See id. at 1318 ("[T]he court has observed that dictionaries . . . can be useful in claim construction."). The dictionary definition of "directly" confirms that the specification's requirement that the adjustment be "directly responsive" to a market indicator does not require that an inflation-adjustment occur immediately after any increase in the reported rate of inflation. While some definitions define "directly" as "simultaneously and exactly or equally" or "immediately," other definitions define it as "after a little: in a little while: shortly, presently." Webster's Third New International Dictionary Unabridged 641 (2002). In view of the latter definitions, we conclude that the broadest reasonable interpretation of "directly responsive" is not limited to situations in which the inflation-adjustment occurs immediately after any increase in the reported rate of inflation, but also includes situations in which the inflation-adjustment occurs "a little while" after an increase in the reported rate, such as when the increase reaches one percent. The Board did not err in concluding that the broadest reasonable interpretation of the term "responsive to the rate of inflation" (and related terms) is not limited to a continuous, one-to-one relationship but also includes a delayed relationship, in which adjustments are made in one percent increments.

II

Turning to the Board's obviousness determination, Trans Texas has relied only on its erroneous claim construction in arguing that claims 24-30, 32, and 34-35 of the

'461 patent, relating to deposit accounts, are non-obvious.[9] We therefore affirm the Board's determination that these claims would have been obvious. See SmithKline Beecham Corp. v. Apotex Corp., 439 F.3d 1312, 1319 (Fed. Cir. 2006) ("[A]rguments not raised in the opening brief are waived.").

Trans Texas also argues that additional limitations appearing in other claims render those claims non-obvious. We cannot agree.

First, Trans Texas argues that claims 36-44 of the '461 patent and claims 1-8 of the '673 patent are non-obvious because, even if Mukherjee discloses deposit accounts responsive to the rate of inflation, Mukherjee does not disclose loan accounts that were fully adjusted with the market indicator of inflation (i.e., the inflation adjustment was equal to the increase in the market indicator of inflation), but instead only discloses loan accounts that were adjusted on a proportional basis with inflation (for example, a one percent increase in the market indicator would only result in a one-half or one-fourth percent inflation adjustment). Trans Texas is correct that the loan accounts Mukherjee describes as having actually been implemented in Finland at most imposed an inflation adjustment of one-half the increase in the rate of inflation. However, Mukherjee also discloses that banks would find the money needed to provide inflation-adjusted deposit accounts by "imposing an 'index surcharge' on all loans. . . . fixed according to the proportion of the bank's deposits benefiting by index adjustment, so that the bank could

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[9] Trans Texas does argue that Mukherjee "teaches away" from inflation-adjusted accounts because it describes how these accounts were abolished in Finland following a "stabilization agreement" between trade unions and employers meant to quell a price surge. It is unclear if this argument was raised before the Board. In any event, the political decision to abolish these accounts as part of a trade agreement is not in any way related to any deficiency in the utility of the invention itself.

just balance its commitments." Mukherjee at 50-51. Further, Mukherjee discloses "A" deposit accounts with "100 per cent index compensation" for every one percent increase in inflation. Id. at 52. Thus, when a bank's deposits were all in inflation-adjusted accounts, the surcharge on loans would equal the full amount of the rate of inflation. Compare id. at 68 ("[I]n a year when the index rose by 10 per cent, a bank with one fifth of its deposits in fully index-linked accounts would place an index surcharge of 2 per cent on all its outstanding loans."). Substantial evidence supports the Board's conclusion that Mukherjee discloses fully adjusting loan accounts based on increases in the rate of inflation.

Second, Trans Texas argues that claims 1-23, 31, 33, and 44[10] of the '461 patent are non-obvious because these claims include a requirement for annuities. The Board relied on the prior art Zvi Bodie reference, An innovation for stable real retirement income, Portfolio Management, Fall 1980, 5 ("Bodie"). Bodie describes a "purchasing power annuity" linked to consumer price levels. Id. Trans Texas argues that Bodie in fact taught away from indexed annuities because it stated that inflation-adjusted annuities "were not commercially available" and noted a "reluctance, if not outright opposition" within certain segments of the market to price-indexed bonds. But, as the Board found, Bodie never indicated that such proposals would not work and in fact

[10] Claim 31, dependent on claim 24, requires that the principal component be retired by making payments to the depositor over a series of "iteration periods." '461 patent col.29 ll.11-14. Claim 33, also dependent on claim 24, specifies that the "index correspond[s] generally to the consumer price index." Id. col.29 ll.19-20. Claim 44, dependent on claim 36, requires that "the means for paying out the deposit account includes means for paying out the deposit principal component by a schedule over the term and means for paying out the deposit accrual component by a schedule over the term." Id. col.30 ll.33-38.

noted that proposals for price-indexed bonds "have abounded." Id. The Board's decision as to what the prior art discloses is reviewed for substantial evidence. See In re Gartside, 203 F.3d 1305, 1308 (Fed. Cir. 2000) (noting that Board factual findings are reviewed for substantial evidence); Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc., 73 F.3d 1085, 1088 (Fed. Cir. 1995) ("What the prior art teaches and whether it teaches toward or away from the claimed invention . . . is a determination of fact."). Substantial evidence supports the Board's conclusion as to what Bodie discloses.

Third, Trans Texas argues that independent claim 9 of the '673 patent and its dependent claims 10-14 and 16-21 are non-obvious because Mukerjee does not teach the limitation "obtaining an asset whose rate of return adjusts with inflation." Appellant's Br. 47. Trans Texas argues that, even if deposit accounts responsive to the rate of inflation were disclosed in the prior art, securities with rates responsive to the rate of inflation were not. We conclude that the Board's finding that the prior art disclosed such securities was supported by substantial evidence. For example, Mukherjee describes the desire of institutional buyers to purchase "[inflation] index-linked securities" and specifically notes that "[b]anks and cooperative credit societies" sought to buy inflation-adjusted bonds "to help pay compensation on indexed deposit accounts." Mukherjee at 59.

Fourth, Trans Texas asserts that Mukherjee does not teach the limitation "obtaining . . . a mortgage secured by real estate" (responsive to the rate of inflation) of independent claim 22 of the '673 patent and its dependent claims (23 and 24). The Board did not err in concluding that it would have been obvious to combine the indexed loan accounts disclosed in Mukherjee with the well-known practice of offering loans

secured by mortgaged real estate. See KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1739 (2007) ("The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.").

Finally, Trans Texas argues that claims 15 and 25-28 of the '673 patent were non-obvious because the prior art does not teach obtaining an inflation-adjusted financial instrument that makes "balloon" payments (i.e., paying the inflation-adjusted principal component at the end of the term). Trans Texas admits that G. Weiner, Choosing a Home Equity Plan, Restaurant Business, (Feb. 10, 1985), "does appear to describe loans where the interest is repaid monthly and the principal in a lump sum." Appellant's Br. 50. The Board did not err in concluding that it would have been obvious to combine the known inflation-adjusted loan accounts of Mukherjee with the known balloon payments of Weiner.

CONCLUSION

We conclude that the Board was not bound by the district court's claim construction and properly construed the term "responsive to the rate of inflation" and related terms. The Board did not err in holding that claims 1-44 of the '461 patent and claims 1-28 of the '673 patent would have been obvious over the prior art.

AFFIRMED